

On-farm Primary Grain Processing in China

SHI JIANFANG

Senior Engineer



**Academy of Agricultural Planning and Engineering,
Ministry of Agriculture and Rural Affairs, China**

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01

Rice and Maize On-farm Processing in China

I. Rice and Maize

According to the statistics, by the end of 2023,

- China's rice acreage reached 29 million hectares, total output was about 208 million tons, and national average yield was about 7.15tons/hectare
- China's maize acreage reached 44.74 million hectares, total output was about 295 million tons, and national average yield was around 6.59 tons/hectare.

Maize is planted in every province, city, and district across the country. China's corn cultivation still primarily relies on smallholder farming, with an average operational scale of 0.52 hectares per household. Smallholder-operated farmland accounts for 70% of the total cultivated land area.



Distribution of Maize-producing Areas in China



Distribution of Rice-producing Areas in China

II. Rice and Maize Products

Rice and maize are mainly processed by processing enterprises, but smallholder households always process grain foods on farm.

Rice processing by households:

- Brown rice
- Milled rice from small-scale rice mill
- Rice flour

Maize processing by households:

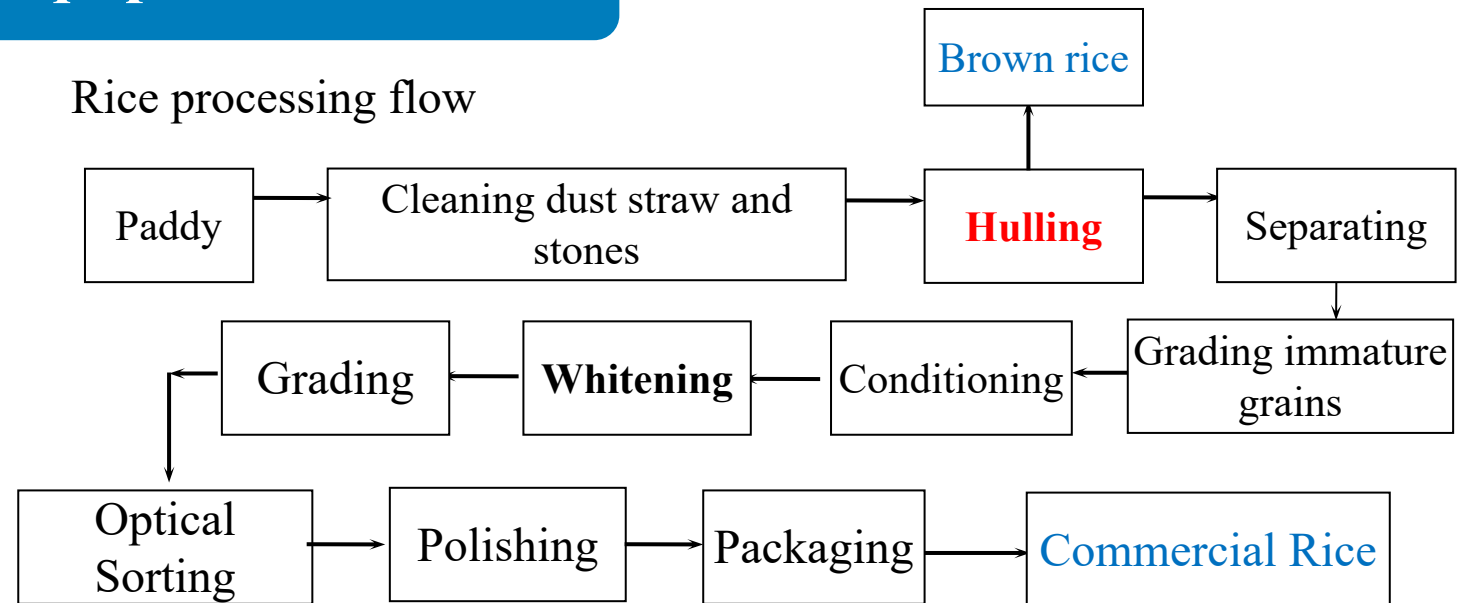
- Maize grits
- Maize flour/meal
- Maize food
- Maize-based feed from cooperatives



III. Rice Processing Flow and Equipment



Rice processing flow

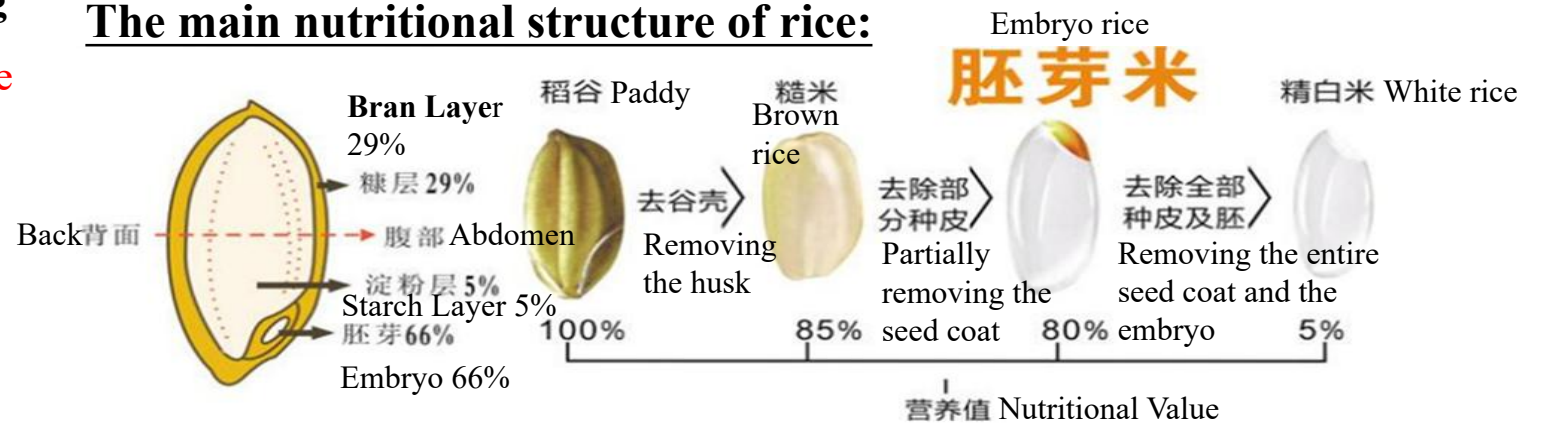


Two most important steps for rice processing

Hulling: The cleaned paddy is hulled to remove the outer husk, resulting in brown rice.

Whitening: The brown rice is whitened to remove the bran layer, producing white rice

The main nutritional structure of rice:



VI. Rice Processing Case



Case 1: The large-scale grain farmer in Hunan Province owns rice planting area of 400 mu (26 hectares), builds the small-scale rice processing production line, including rice huller, milling machine, packaging and other core equipment, which can process 1-2 tons paddy and produce around 1 ton rice each hour.

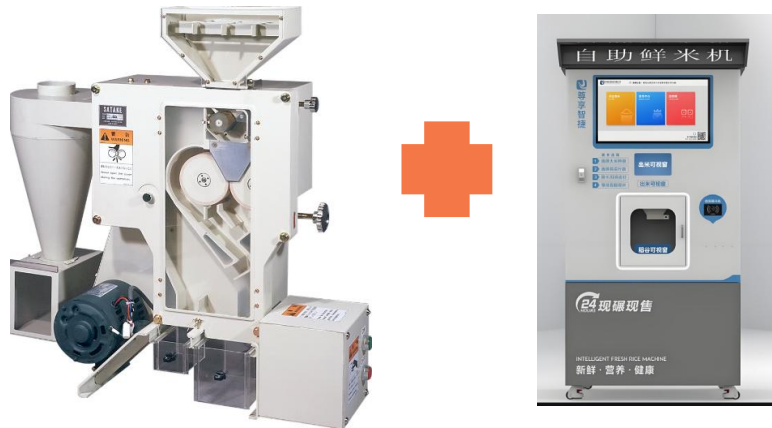
Facilities: 200-300m² factory building.



Processing and Retailing: mainly provide processing service for neighboring farmers and sales to villages and communities.

VI. Rice Processing Case

Case 2: Rice Milling Machines purchased by farmers or consumers

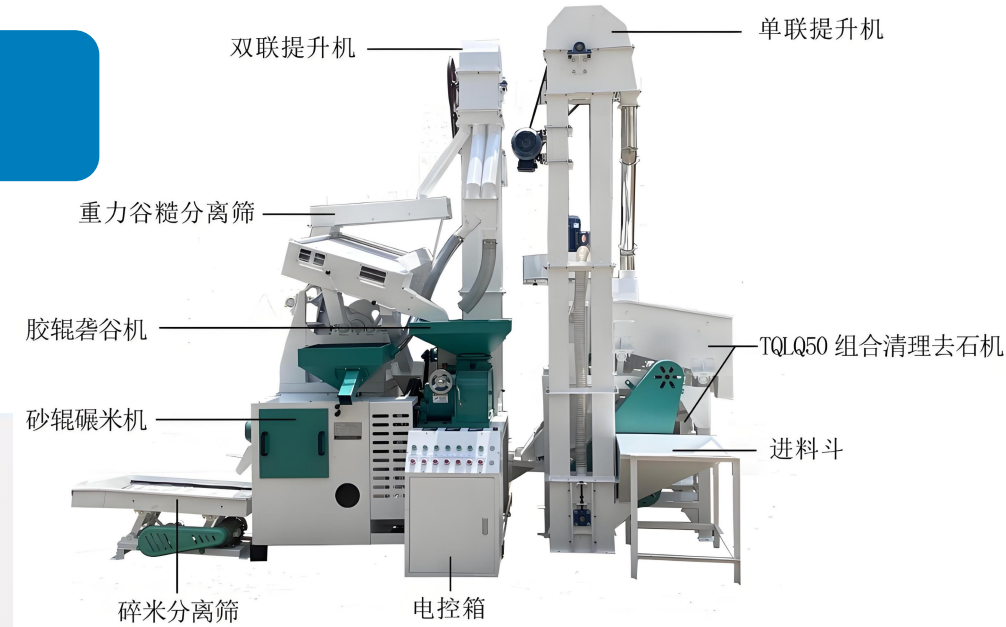


Hulling + Rice Milling

Standalone Rice Milling Machines



Combined Rice Milling Machine

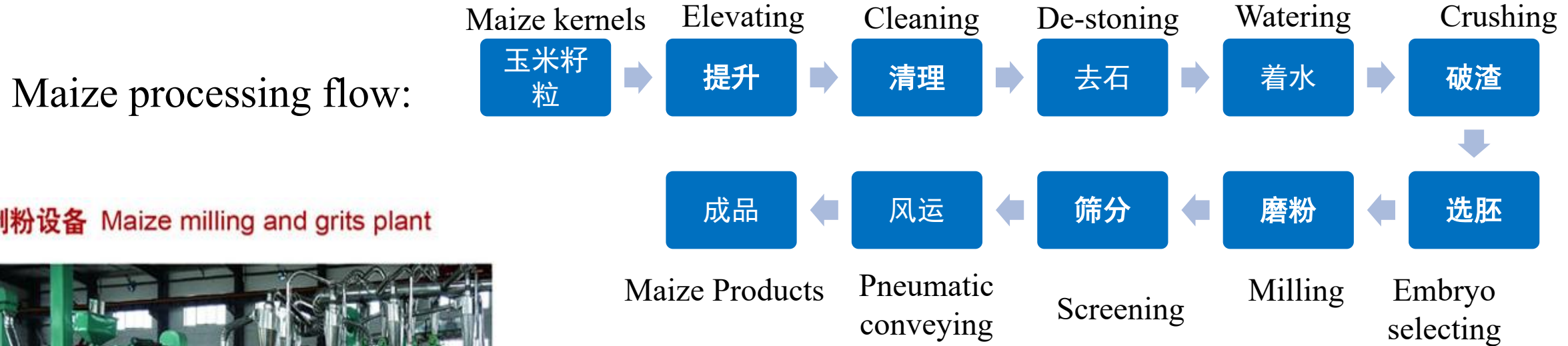


Residual germ or small black dots



看得见的胚芽

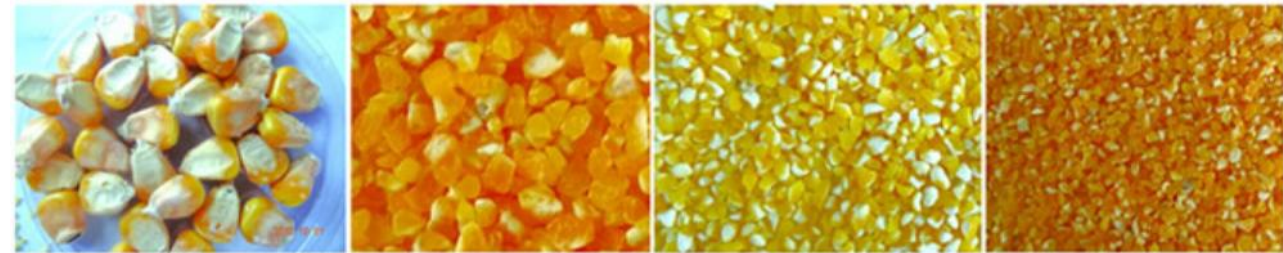
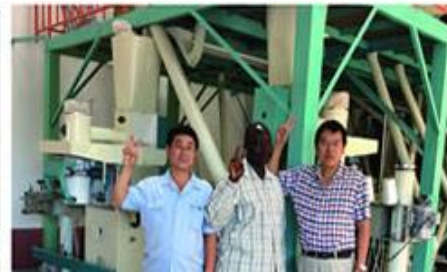
V. Maize Processing Flow and Equipment



玉米制糝制粉设备 Maize milling and grits plant



20 吨玉米制粉成套设备
20t maize flour mill
complete plant



IV. Maize Processing Case

Case 3: A 10 tons/day maize milling and processing production line established by the farmer cooperative

Facilities: 200-300m² processing workshop

Marketing: Mainly wholesale and retail markets, e-commerce platforms

Requirements:

- Business license, food production license, food business license (or filing), health license, etc. In China, one generally needs to apply for the licenses and permits through the Market Supervision and Administration Department.
- National or industry quality standards, environmental requirements and packaging identification.



IV. Maize Processing Case

Case 4: Maize Milling Machine

The maize milling machine integrates functions of screening, crushing and milling, with an output of 300-600kg per hour.

Facility: Self-processing and construction

Scale: Suitable for small-scale farmers



02

China's Policy on On-farm Grain Processing and Grain Post-harvest Loss Reduction

I. China's Policy on Grain Processing and Loss Reduction



- **Our Government attaches great importance to food security**
- **Highlight "large-scale planting, mechanized production, intensive farming, specialized services, and industrialized development", call for strong support for new agricultural business entities such as family farms, large-scale grain farmers, farmer cooperatives, and leading value chain enterprises, improve the level of intensive farming, large-scale operation, and socialized services, and increase farmers' farming income.**

I. China's Policy on Grain Processing and Loss Reduction



- Facilitate the flourishing development of **agricultural product processing industry**, optimize the industrial layout, and promote the transformation of rural areas from selling raw materials to selling finished products.
- To ensure the stable and safe grain supply, prioritize “source of grain & market of food” “agricultural production & product processing”, classify and effectively manage the processing of major agricultural products such as grains and oils, improving the technology of the agricultural processing industry. At the same time, through projects like “Industry Strengthening Towns,” support farmer cooperatives and other agricultural business entities to build grain and other agricultural product processing facilities in villages, towns, and rural areas.

II. Experience and Model of Smallholder Grain Processing in China

China has traditionally had the custom of processing rice, wheat, and maize in rural areas since ancient times. For example, the Han Dynasty achieved a relatively high level in grain processing technology, leading to the widespread use of tools such as mortars and pestles, foot-operated querns, winnowing machines, and stone rotary mills. There are also many food processing methods in China, such as rice cakes, rice noodles, maize noodles, maize steamed bread (Mantou), wheat-based steamed buns (Baozi), etc.

Around 2014, according to the scale of China's grain production, the agricultural and rural departments conducted field research to understand the grain drying, storage, milling, and food processing by smallholders, large-scale grain farmers and farmer cooperatives, and implemented the “technology-led trial” programme.



II. Experience and Model of Smallholder Grain Processing in China

From 2017 to 2018, the Grain Drying and Storage Center was included in the on-farm primary grain processing project supported by the government subsidy, demonstrated and promoted nationwide. The subsidy for each set did not exceed 30% of the total cost.

For staple food processing, production and marketing models were promoted, such as “Production base + Central kitchen + Catering stores” and “Production base + Processing enterprises + Supermarket”, and the development of staple food processing industry was accelerated.



In recent years, responding to shortages of on-farm processing, policies have been formulated to support the tailored on-farm primary grain processing.

Main Entity

Village collective economic organizations, family farms, farmer cooperatives, and agricultural enterprises

Supporting Activities

- Construction and renovation of supporting facilities such as processing plants
- Purchasing and upgrading digitalized and green processing equipment
- Promoting advanced processing technologies and purchasing technical services
- Other key parts in agricultural product processing

Grain Crop Producing Area

- Build the **Grain Drying Centre** for grain processing steps such as cleaning, drying, storage, hulling
- Build the innovative energy-saving grain storage facility and intelligent monitoring system
- Facilitate construction projects for grain milling and processing equipment and facilities

Ministry of Agriculture and Rural Affairs document

农业农村部办公厅文件

农办产〔2024〕4号

农业农村部办公厅关于印发农产品产地加工项目 入库指南和重点建设内容目录的通知

各省、自治区、直辖市及计划单列市农业农村(农牧)厅(局、委),
新疆生产建设兵团农业农村(农牧)局:

为贯彻落实2024年中央一号文件关于推动农产品加工业
优化升级的部署要求,引导中央财政衔接推进乡村振兴补助资金支
持做好“土特产”文章,促进农产品加工业高质量发展,进一步提
升县有关农产品产地加工项目编制水平,提高巩固拓展脱贫攻坚
成果和乡村振兴项目库储备项目质量,农业农村部研究制定了
《农产品产地加工项目入库指南》(以下简称《指南》)和《农产品

农办产〔2024〕4号

农业农村部文件

农产发〔2024〕2号

农业农村部关于印发《促进农产品 加工业发展三年行动方案(2024—2026年)》的通知

各省、自治区、直辖市及计划单列市农业农村(农牧)、畜牧兽医、
农垦、渔业厅(局、委),新疆生产建设兵团农业农村(农牧)局:

农产品加工业是国民经济的重要产业和农业现代化的重要力
量,对促进农业提质增效、农民就业增收和农村一二三产业融合发
展具有重要作用。习近平总书记强调:“要积极发展农产品加工
业,优化产业布局,推动农村由卖原字号向卖制成品转变”。2024
年中央一号文件作出“推动农产品加工业优化升级”的部署要求。
这次党和国家机构改革,强化了农业农村部指导农产品加工发展

农产发〔2024〕2号

To improve local processing and avoid over-processing, the Ministry of Agriculture and Rural Affairs has issued the *Guidance on Promoting the Loss Reduction and Efficiency Improvement in Grain Processing*.

- **Strengthening facility construction, prioritizing the development of grain primary processing such as drying, storage, husking, impurity removal, and milling, and achieving value preservation and appreciation.**
- **Reducing over-processing.** Reduce resource waste and nutrient loss caused by excessive processing of refined flour, rice, etc., and improve the milling rate of flour and rice.



中华人民共和国中央人民政府

www.gov.cn

农业农村部关于促进农产品加工环节减损增效的指导意见

日期：2021-10-08 16:15

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【字号：大 中 小】

打印本页

各省、自治区、直辖市及计划单列市农业农村（农经）厅（局、委），新疆生产建设兵团农业农村局：

二、加强设施建设，发展农产品初加工减损增效

近年来，
过度问题突
工业高质量

（四）**发展延长销售时间类初加工**。支持农民合作社、家庭农场和中小微企业等，建设烘干和储藏等设施，延长供应时间，有效降低损耗，促进提升品质。**粮食等耐储农产品**，重点发展烘干、储藏、脱壳、去杂、磨制等初加工，实现保值增值。**果蔬、奶类、畜禽及水产品等鲜活农产品**，重点发展预冷、保鲜、冷冻、清洗、分级、分割、包装等仓储设施和商品化处理，实现减损增效。

一、总
（一）
食安全目标
用、多环节

（五）**发展终端消费需求类初加工**。拓展农产品初加工范围，减少产后损失。**食用类初级农产品**，重点发展清洗、分级、包装、切分、发酵、压榨、灌制、炸制、干制、腌制、熟制等初加工，提高农产品附加值。**棉麻丝、木竹藤棕草等非食用类农产品**，重点发展整理、切割、粉碎、打磨、烘干、拉丝、编织等初加工，开发多种用途。

三、改进工艺装备，发展农产品精深加工减损增效

（二）
坚持分
持标准引领
坚持创
坚持绿
（三）
到2025

（六）**促进进口粮品种适度加工**。引导农产品加工企业合理确定小麦、稻谷等口粮品种加工精度，减少精面、精米等过度加工造成的资源浪费和营养流失。

五、强化标准引领，推进农产品加工创新减损增效

（十一）**完善农产品加工标准体系**。按照“有标采标、无标创标、全程贯标”要求，制修订农产品加工业国家标准和行业标准，建立适宜的农产品及其加工制品评判标准体系。健全果蔬、畜禽、水产等鲜活农产品加工技术规范、操作规程和产品标准。修订稻谷、小麦等口粮加工标准，降低色度、亮度等感官指标，提高出米率、出粉率等产出指标。完善玉米等深加工标准，提高加工层次。

（十二）**开展加工技术创新**。组织科研院所与农产品加工企业开展联合攻关，研发一批集自动测量、精准控制、智能操作于一体的绿色储粮、动态保鲜、快速预冷、节能干燥等减损实用技术，以及实现品质调控、营养均衡、清洁生产等先进加工技术，减少资源浪费和营养流失。

（十三）**推进加工装备创制**。引导农产品加工装备研发机构和生产创制企业，开展智能化、清洁化加工技术装备研发，提升农产品加工装备水平。运用智能制造、生物合成、3D打印等新技术，集成组装一批科技含量高、应用范围广、节粮节水节能的农产品加工工艺及配套装备，降低农产品加工物耗能耗。

六、加强组织领导，保障农产品加工减损增效措施落实到位

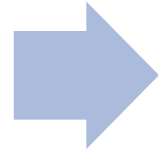
（十四）**强化统筹协调**。将减少农产品加工环节损失浪费纳入有关责任制考核内容，建立农产品加工环节减损增效协调机制，调度分析加工环节减损增效措施落实进展，研究改进的具体措施。各级农业农村部门要承担起牵头抓总的职责，加强与发展改革、财政、工业和信息化、市场监管等部门的沟通协调，推进各项措施落实。引导大型农产品加工企业主动扛起重任，把农产品加工环节减损增效的各项措施落到实处。

（十五）**强化政策支持**。支持农产品加工企业参与农业产业强镇、现代农业产业园、优势特色产业集群等相关项目建设，改造提升加工技术装备。完善农机购置补贴政策，拓展烘干、清选、粉碎、磨制等农产品初加工机械购置补贴范围。支持农民合作社和家庭农场与农业产业化龙头企业通过利益联结组建农业产业化联合体，共同促进农产品加工环节减损增效。引导金融机构对减损增效成效显著的农产品加工企业优先提供贷款支持。

（十六）**强化宣传引导**。加强公众营养膳食科普知识宣传，引导消费者树立科学、健康的消费理念，逐步转变追求口粮“亮、白、精”的消费习惯。发挥社会组织作用，督促农产品加工企业严格执行国家和行业标准。总结推广一批农产品加工环节减损增效发展模式和典型案例，充分运用传统媒体和新媒体全方位宣传推介，营造全社会共同关注、协同支持农产品加工环节减损增效的良好氛围。

农业农村部

2020年12月23日



Grinding and processing workshop at the farm-level, enterprise processing



Staple food workshop, in-store processing, enterprise processing

Collaborative / Independent Mode

State Farm/Enterprise Order + Farmer Cooperative + Family Farm + Large-scale Grain Farmers+ Smallholders



Mode
Enterprise + Farmer Cooperative + Smallholders



Members of Kangda Black Wheat Specialized Farmer Cooperative in Dacheng County are using a stone-mill to process black wheat flour



Mode
Enterprise + Farmer Cooperative + Smallholders



Traditional food processing rice-noodle processing workshop by Pengshui County Lehui Hongye Development Specialized Farmer Cooperative

03

How to Support Smallholders to Access Market

I. Challenges of Smallholder Market Access in China

The majority farmers in China are smallholder farmers with less than 50 mu (3.33ha) farming land.

Main Challenges

- **Difficult for smallholder farmers to access information.** Smallholders often struggle to obtain key information, such as market supply and demand, price fluctuations, and policy adjustments, in a timely and accurate manner, make experience-based decision or show herd behaviour, resulting in frequent overproduction or underproduction
- **Limited proportion in the value chain development.** As the increasing value chain development in China, the mismatch between smallholder agriculture and the demands of the large market is growing more evident.
- **Insufficient scale and limited market negotiation capabilities.**

Strategy

- Scaling up the agricultural business entities, strengthening the socialized services such as land transfer, farmer cooperative operation, land management, which enhance the scale of smallholder agricultural development.
- Promoting the agricultural industrialization mode of “smallholder farmers + enterprises“, to strengthen the organizational level of agricultural production and commerce, leverage corporate knowledge to address the information deficit in planting and primary processing at the farm level, extending the agricultural value chain.

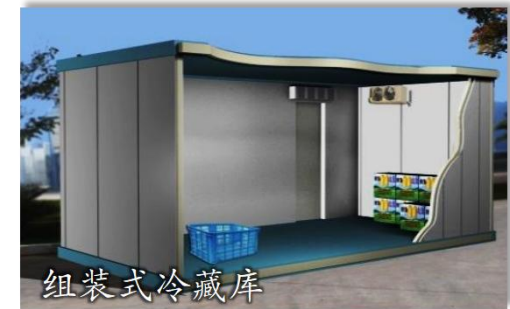
II. Why are policies introduced for the on-farm primary grain processing? How do they support smallholders to access markets?

Integration and promotion of technology and equipment for on-farm primary grain processing

Project Idea: To improve on-farm primary grain processing facilities, the Ministry of Agriculture and the Ministry of Finance jointly organise and implement the subsidy policy programme. Through the "rewarding instead of subsidy" method, they support smallholders and specialized farmer cooperatives to build storage, preservation, and drying facilities, including project design, technical plan, on-site guidance, technical training, project management, etc.

Project Period: From 2012 to 2018, in 911 counties in 31 provinces (autonomous regions, municipalities) in China

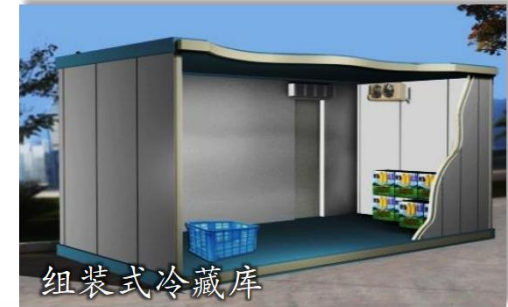
Policy Priority: e.g. potato storage cellar, fruit and vegetable cold storage, fruit and vegetable drying facilities, grain drying centers, etc.



III. Achievement and Impact

The central government arranged a total of 5.5 billion yuan (around 768 million USD) in special funds, accumulatively subsidizing 73,000 farm households, 26,500 specialized farmer cooperatives and family farms, and more than 3,300 enterprises, building a total of 58,000 potato storage cellars, 61,000 fruit and vegetable storage warehouses, and 19,000 fruit and vegetable drying facilities, with the improved storage capacity of 2.06 million tons of potatoes, 4.16 million tons of fruits and vegetables, and improved drying capacity of 2.87 million tons of fruits and vegetables.

The storage and processing periods for agricultural products have been extended, effectively reducing the post-harvest loss, improving the quality of agricultural products, and increasing farmers' incomes.



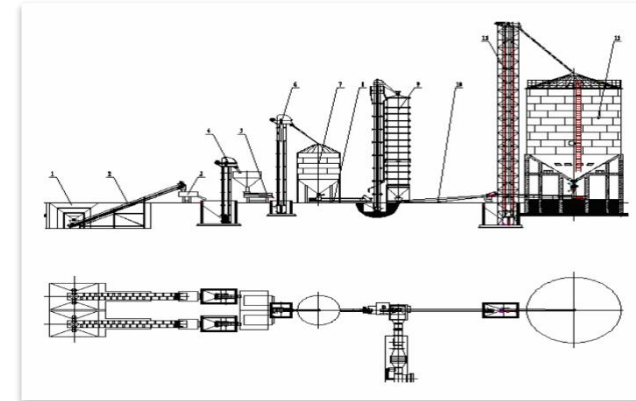
IV. Stakeholder Roles

Central Government & Governments at different levels: investigate the industry development in provinces, cities, counties, and townships, and formulate policies/assist in formulating policies.

Scientific Research Institutions: research and demonstration.
(For example, the research, demonstration and promotion of adaptable small-scale grain storage facilities for smallholder farmers in different regions. Around 2010, the nationwide research and demonstration had been conducted on adaptable maize and wheat-related technologies, equipment, and facilities for large-scale grain farmers and specialized farmer cooperatives.)

Enterprise: project implementation, enterprise operation, market development, collaboration with smallholders, technical guidance, etc.

Farmer cooperatives + Smallholder Farmers: organize farmers to carry out cultivating, harvesting, drying, storage, and moderate processing.



V. Best Practice on Supporting Smallholder Market Access

- 1. Improving the subsidy system for producers of grain and other important agricultural products.** For example, implementing the minimum support price policy for paddy and wheat, and improving the subsidy policies for maize and rice producers.
- 2. Providing the subsidy for purchasing agricultural machineries.**
- 3. Strengthening socialized services for agricultural activities and support to on-farm grain processing projects.** For example, the Industry Strengthening Town Project, relies on 1-2 leading agricultural value chains in the town, encourages the construction of bases and development of primary processing, and builds warehouses and logistics, promoting the integrated development of agriculture, processing, and service industries with smallholder farmers.

农业农村部办公厅 财政部办公厅关于
印发《2024—2026 年农机购置与
应用补贴实施意见》的通知

各省、自治区、直辖市及计划单列市农业农村(农牧)厅(局、委)、
财政厅(局),新疆生产建设兵团农业农村局、财政局,北大荒农垦
集团有限公司,广东省农垦总局:

为规范实施农机购置与应用补贴政策,充分发挥政策效益,推
动农业机械化全程全面高质量发展,有效支撑粮食和重要农产品



V. Best Practice on Supporting Smallholder Market Access

4. Developing the moderate scaled business in various ways and fostering the innovative agricultural business entities

For example, the **“Leading Farmer Plan”** provides training subsidies and long-term tracking their training and learning progress.

For example, guiding agricultural research institutions, agricultural universities, agricultural enterprises, and technology specialists to **establish agricultural demonstration pilot bases on the frontline of agricultural production.**

For example, supporting village committees to organize smallholders to construct and manage the agricultural infrastructure, build the central storage, drying, seedling, and processing facilities in the village area.



V. Best Practice on Supporting Smallholder Market Access

Model: Leading Enterprise + Farmer Cooperative + Smallholders

- **Contract Farming:** Enterprises sign contracts with smallholders, provide drying services and purchase agricultural products, securing smallholders' profits.
- **Branding:** Enterprises integrate smallholders' production resources (e.g. land), create the brands (such as "Shimen Rice") to achieve high quality and high price (selling price is 30% higher than the market average), and ensures the profit sharing for smallholders through the mechanism (e.g. "land transfer for rice ticket"), supporting more than 8,000 households to increase their income.





World Food
Programme



Thank You!



Sharing for Learning