

WFP SSTC Field Pilot Project in Peru supported by China

Good Practices in Fresh Food Production ——fruits and vegetables

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Personal profiles

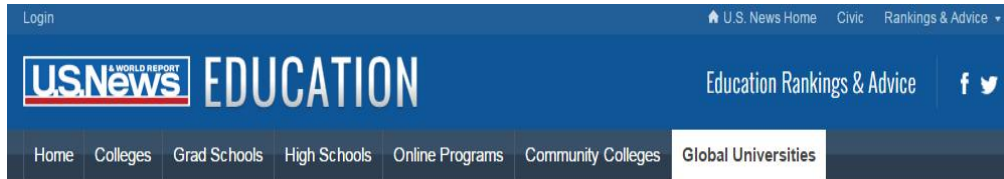
● Work experience

- 1994.08~ Nanjing Agricultural University
- 2014.03~2015.03 Wageningen University And Research, Netherland
- 2003.02~2004.02 Heriot-Watt University, England
- 2019.07~2019.10 Department of Agro-Industry, Ministry of Agriculture, Forestry and Fisheries, Cambodian



● Research interest

- Food Storage and Process
- Detection of Transgenic Food



Best Global Universities for Agricultural Sciences



Nanjing Agricultural University
(a university specializing in agricultural science research and education)



• Food Science and Engineering (NAU)



No.11

World Rank	Institution*	Country/Region	Total Score	Score on PUB ▾
1	University of Wageningen		289.0	97.3
2	Jiangnan University		284.5	100
3	China Agricultural University		264.8	91.9
4	South China University of Technology		254.0	74.3
5	Ghent University		243.1	74.7
6	Zhejiang University		242.8	76.7
7	University of Sao Paulo		242.0	82.1
7	University of Campinas		242.0	81
9	University of Massachusetts Amherst		240.1	56
10	University of California, Davis		235.8	77
11	Nanjing Agricultural University		233.5	70
12	University of Porto		231.3	67.7
13	University of Copenhagen		229.5	68.3
14	University of Guelph		228.8	70.5
15	KU Leuven		227.2	62.7
16	University College Dublin		221.9	58.4
17	Nanchang University		219.8	57.6
18	Northwest A&F University		219.4	69.2
19	Rutgers, The State University of New Jersey - New Brunswick		213.4	55.2
20	University of Naples Federico II		211.6	58.3

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Questions before introduction

- ☐ What are the internal and external factors for fresh food production supply chains in our two countries?
- ☐ How can farmers or growers and related organizations gain and maintain insight into changing consumer demands, especially during COVID-19.
- ☐ How to improve production quality and food safety from farm to table?
- ☐ How to strengthen the international competitive of fresh food production?

01

Introduction of *Fresh Food Production*



2.2 Fresh Food Production

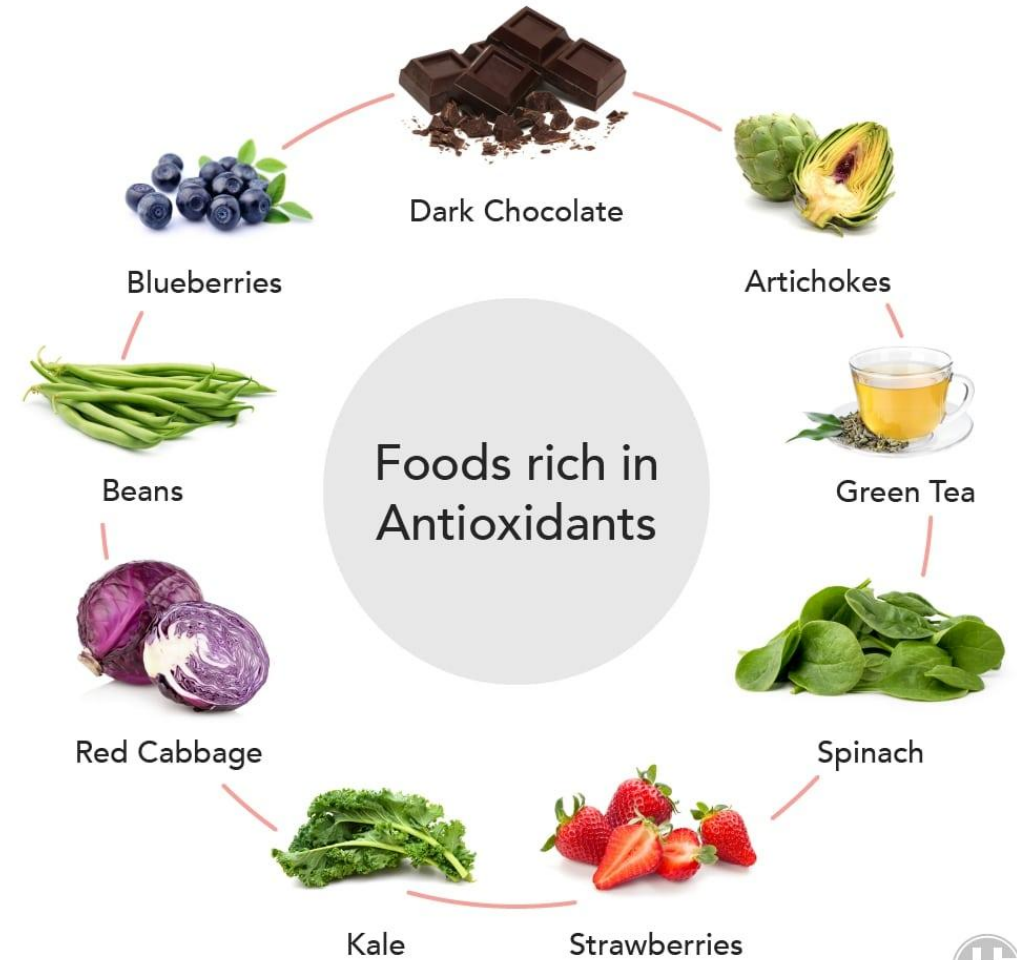
- Fresh Food Production including fresh fruits and vegetables, meat and aquatic products, which are primary agricultural products.
- Our state stipulates that primary agricultural products refer to plants, animals, microorganisms and their products obtained in agricultural activities, excluding all kinds of processed products.



1.1.1 Fresh fruits and vegetables

- As is known to all, the six nutrients include water, protein, fat, dietary fiber, vitamins and minerals.
- In fruits and vegetables, water, fiber, vitamins, and minerals are mainly provided to the human body, and the water content of most fruits and vegetables is more than 90%, but the content of protein and fat is less.





Functional components content



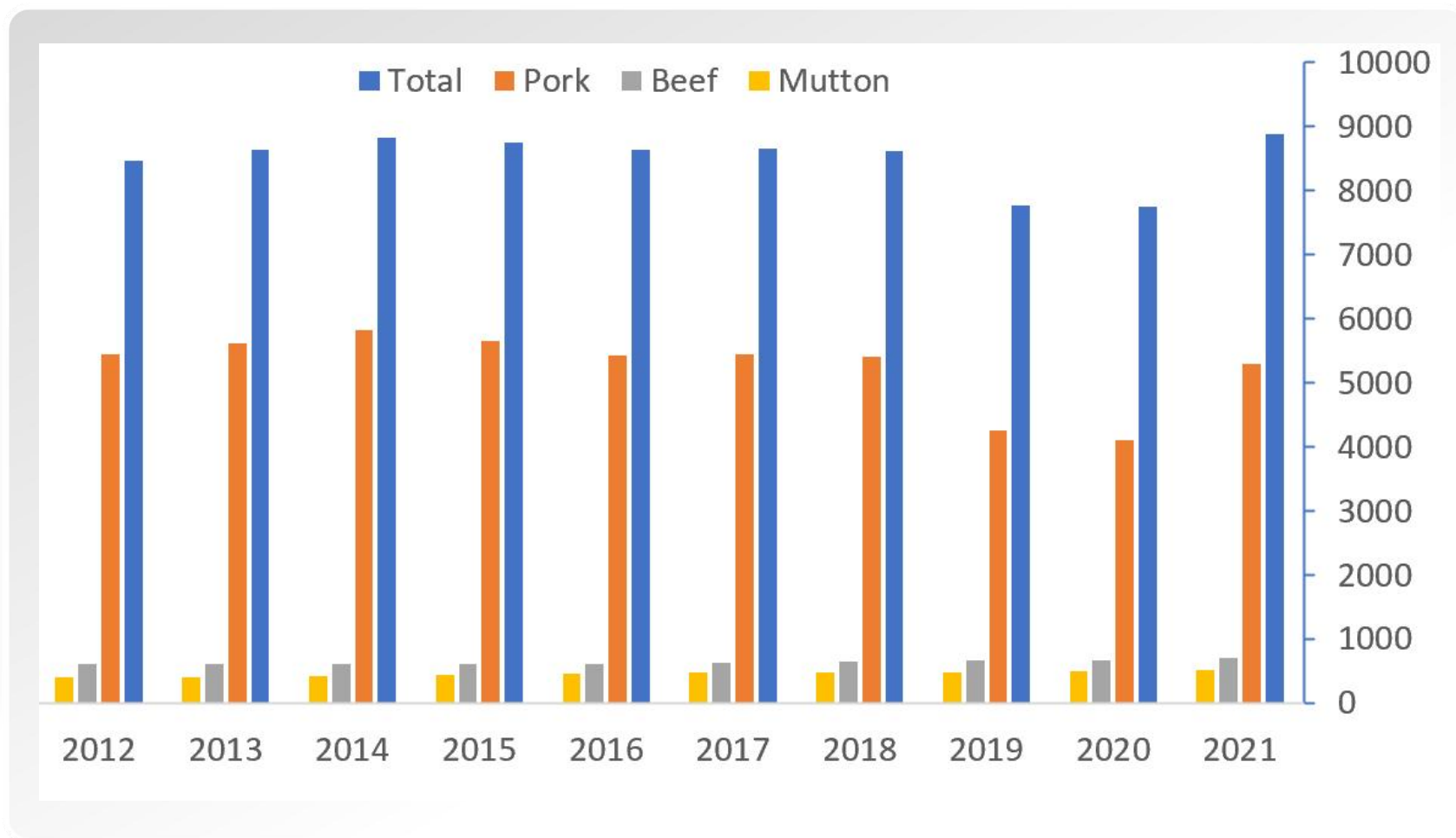
1.1.2 Meat

- **Meat**, the flesh or other edible parts of animals (usually domesticated cattle, swine, and sheep) used for food, including not only the muscles and fat but also the tendons and ligaments.
- Meat is valued as a complete protein food containing all the amino acids necessary for the human body. The fat of meat, which varies widely with the species, quality, and cut, is a valuable source of energy and also influences the flavour, juiciness, and tenderness of the lean. Parts such as livers, kidneys, hearts, and other portions are excellent sources of vitamins and of essential minerals, easily assimilated by the human system.

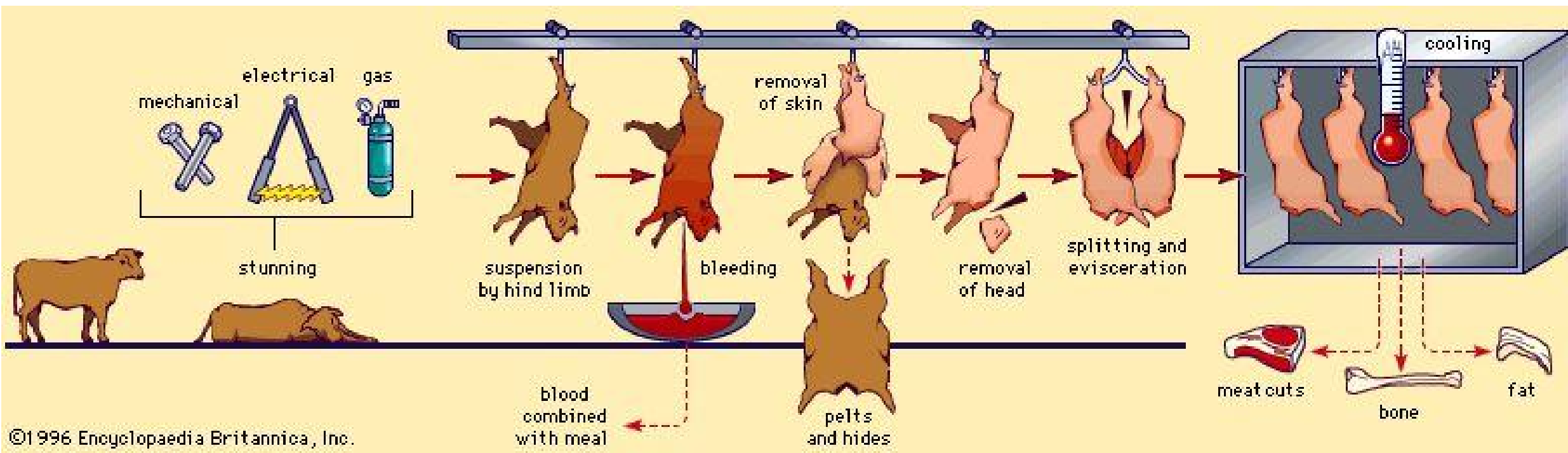


Meat

The world's most widely consumed meat is beef.
The pig is the second largest provider of meat.



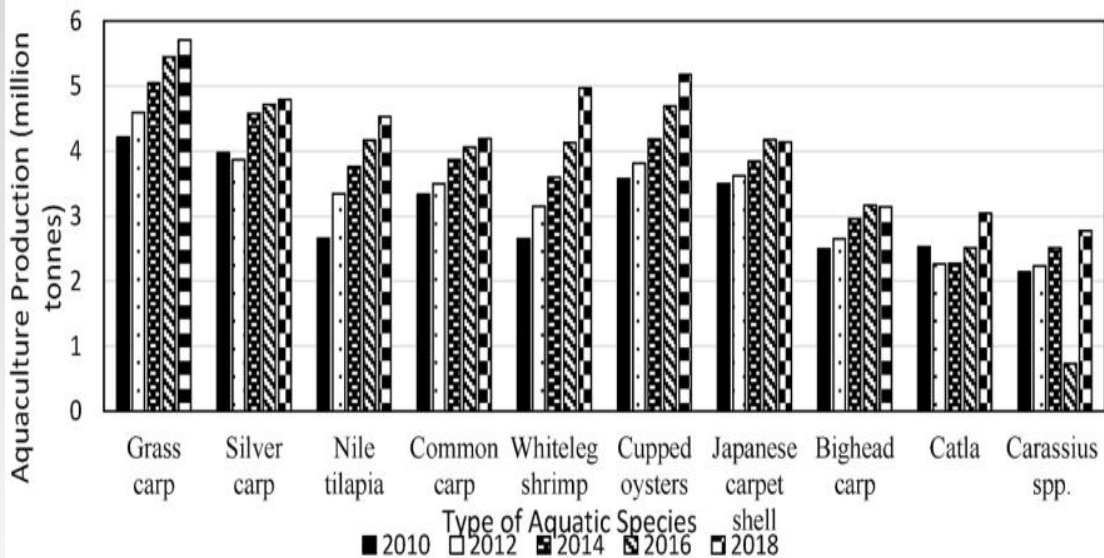
The basic slaughtering process



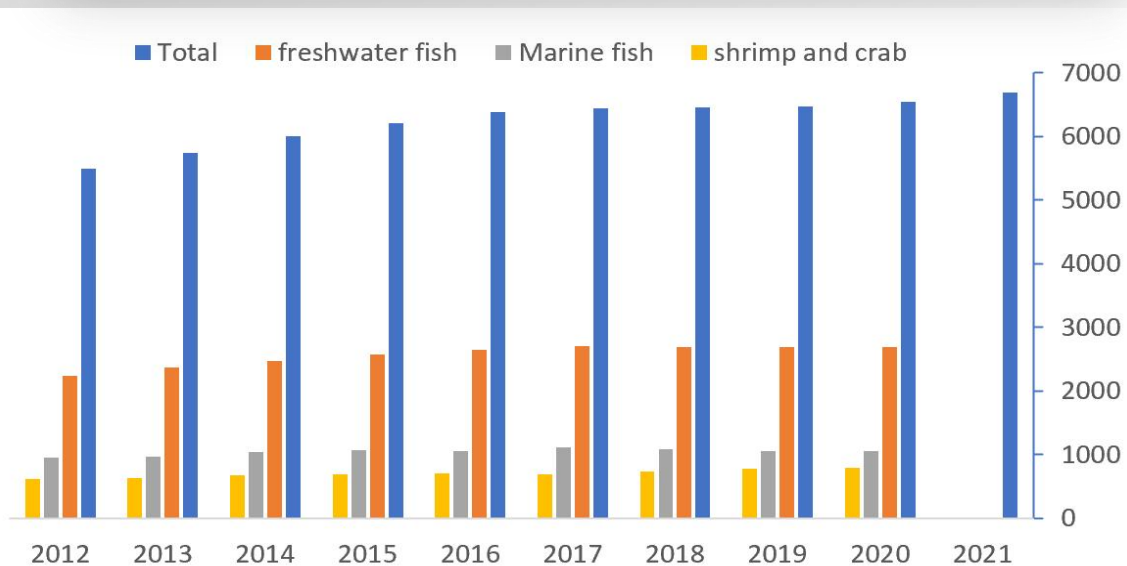
1.1.3 Aquatic production

- Aquatic production constitute a major source of protein for human consumption.
- Aquatic production including fish, mollusks, crustaceans, and aquatic plants.
- Aquatic production in the markets are quite different determined by local traditions reflecting the species found in nearby aquatic environments. With the increasing international trade, more species are being transported to new markets, and the consumers get to know a much larger variety than the local market offered previously.

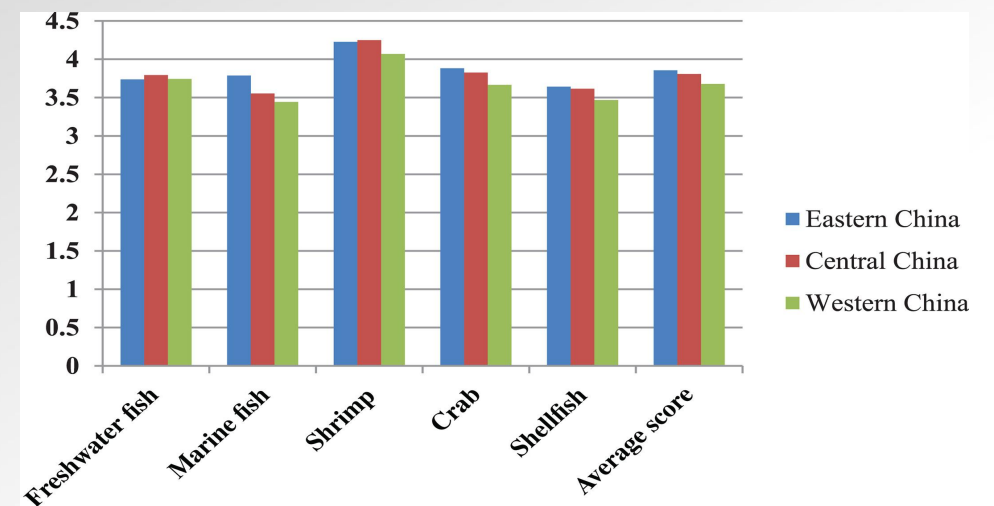




Major species produced in aquaculture (2010–2018)



Consumer preferences for various aquatic products by region



J World Aquaculture Soc, Volume: 53, Issue: 1, Pages: 47-59, First published: 15 June 2021, DOI: (10.1111/jwas.12823)

1.2 Quality of Fresh Food Production

- ◆ The rapid increase in the economy, population, industrialization, and urbanization of CHINA has driven the fast development of FOOD industries over recent decades.
- ◆ The consumption of fresh food production increase much more than that of last century.
- ◆ Quality and safety has become an essential part of satisfying the needs and expectations of consumers.
- ◆ Public health and the economy are directly affected by food safety hazards, which should have priority over other quality criteria.

- Quality is a subjective term for which each person has his or her own definition. In technical usage, quality can have two meanings:
 - ✓ the characteristics of a product or service that bear on its ability to satisfy stated or implied needs;
 - ✓ a product or service free of deficiencies.
- Real quality also means service, pick of the product, on time delivery and after sales service.
- The quality of Fresh production is good when it is harvested.
- Deterioration sets due to natural senescence, water loss, injury, pathogenic attack, which all are influenced by *temperature*.



Major Determinant of the Quality

- Product quality is determined by a set of attributes or characteristics of fresh food production, as well as how those attributes and characteristics are assured and communicated to consumers.
- Information on food quality for consumers is featured in the media, and delivered by health care professionals, governments, consumer groups, and food processors and retailers as part of their advertising strategies.
- Consumer quality are influenced by a variety of factors including taste, convenience, price, available alternatives, health status, and cultural traditions.
- Consumers are thinking about quality attributes such as food safety, nutrition, organic production, fair trade, free range, animal friendly, and locally grown.

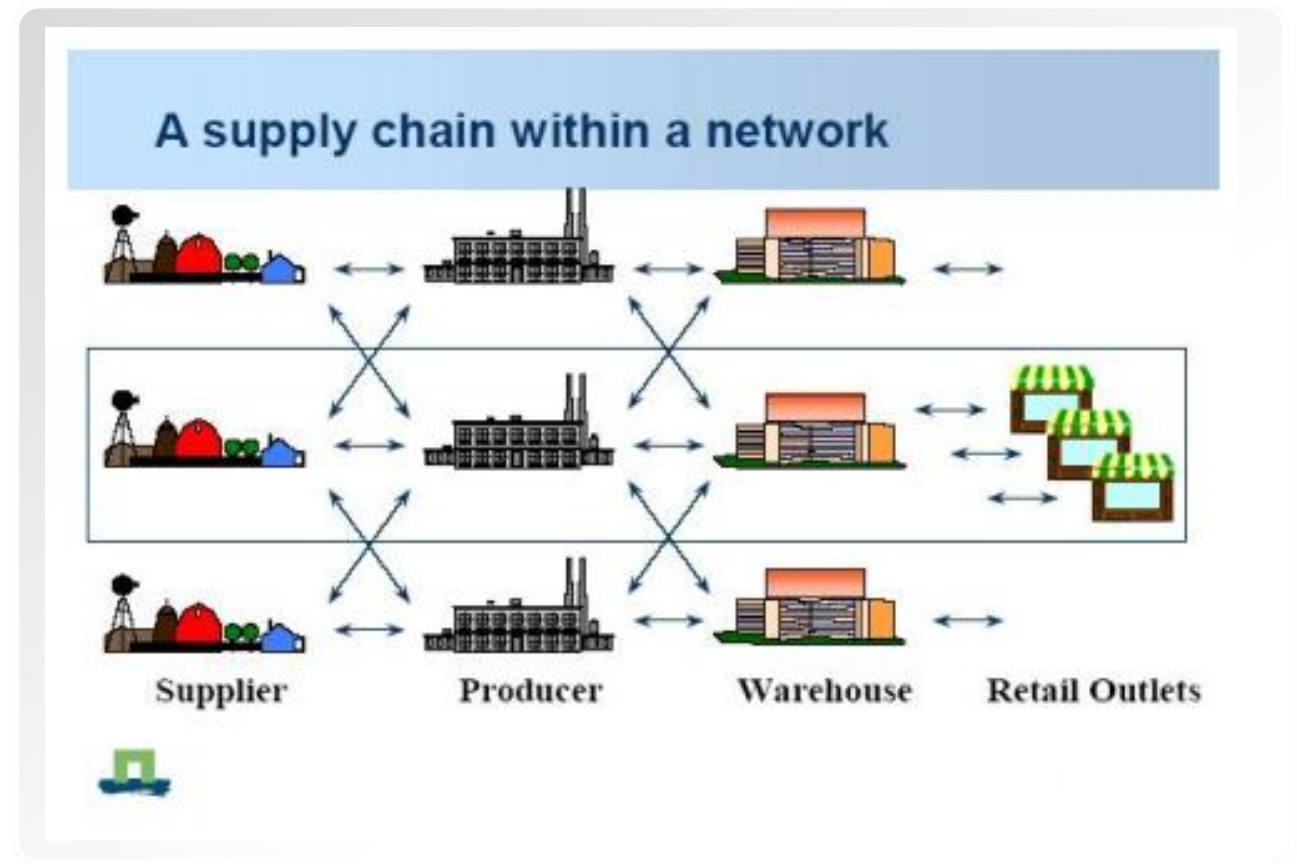
02

Fresh Food Supply Chain



Concept of supply chain

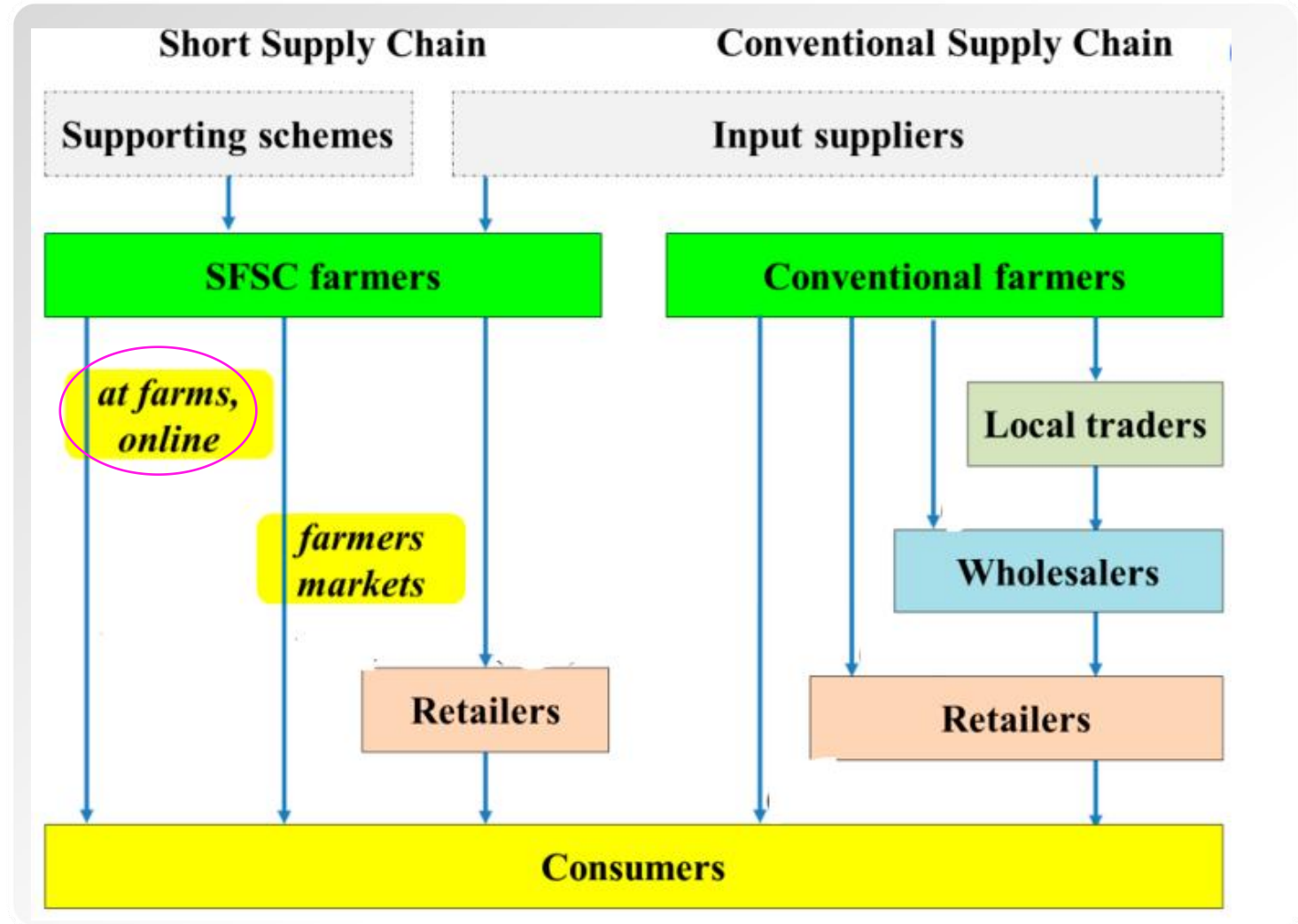
- A supply chain in a network of (physical and decision making) activities connected by **material**, **information** and **money** flows that cross organizational boundaries.
- All the stages involved in satisfying **customer demand**.



- ❑ In the last century, Chinese typical traditional supply chain for small farmers' fresh fruits and vegetables consists of three main stages:
- ❑ In the first stage, small farmers offer their small harvests to traders in the village markets or first assembly points.
- ❑ The second stage involves the movement of the accumulated produce along the supply chain to secondary collection centers.
- ❑ The produce is then moved in the third stage to central wholesale markets in urban centers.
- ❑ Transportation of fresh produce from the farm gate to the primary and secondary collection centers is primarily as shoulder loads or by means of farm animals, wheel barrows, carts, bicycles, motorcycles, and motor vehicles of all sorts.
- ❑ There is the critical need for improved pre-processing systems such as precooling, washing, cleaning, grading, packaging, refrigerated transport and cold chains for perishable produce for better produce quality and food safety.

Food supply chain

- The rapid increases in economy, environmental pollution, urbanization, health concerns, and technological progress enhance the demand for greener, healthier, and fairer food production and consumption nowadays.
- The short food supply chain (SFSC) becomes one of the crucial solutions for these issues.
 - Such as perishable fruits and vegetables supply chain



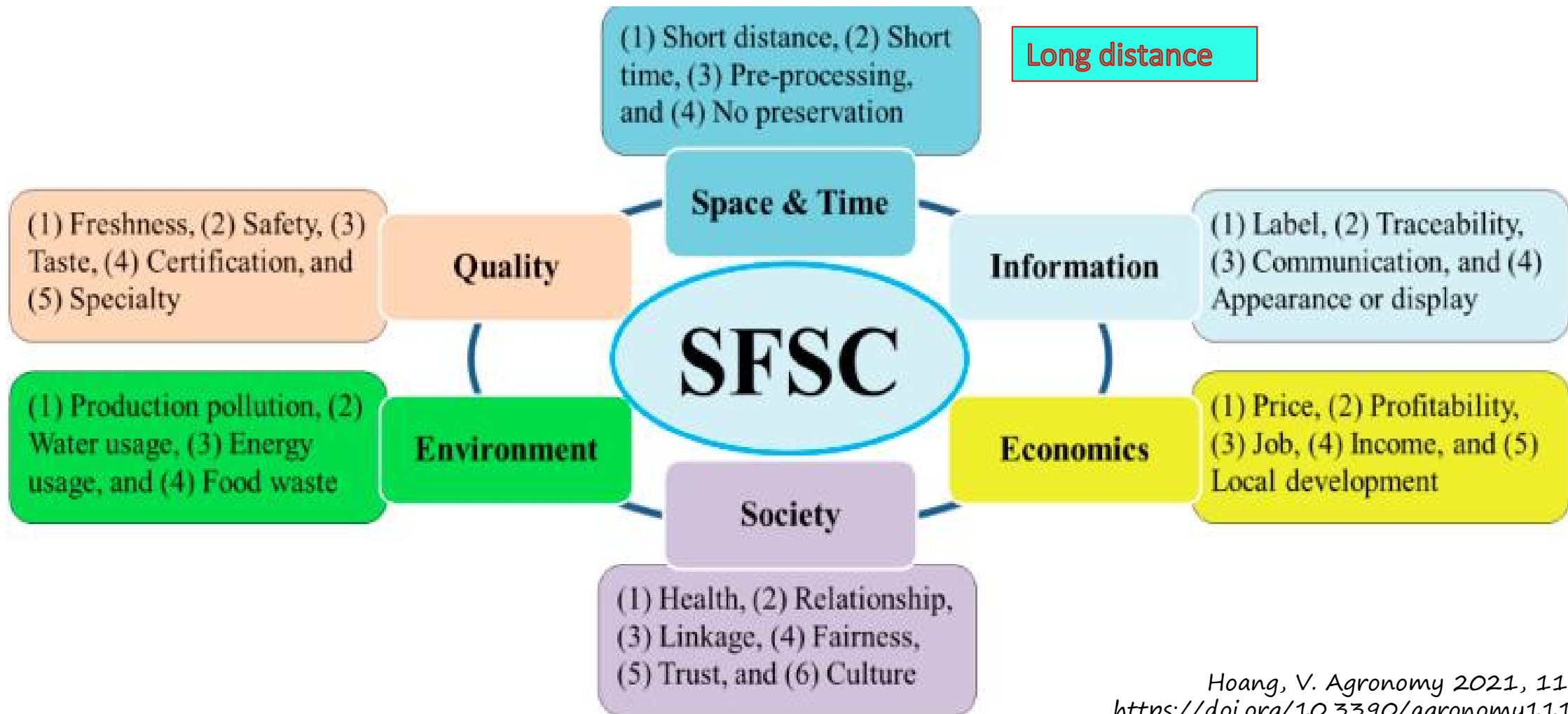
The product flow in SFSC



Hoang, V. *Agronomy* 2021, 11, 2408.
<https://doi.org/10.3390/agronomy11122408>

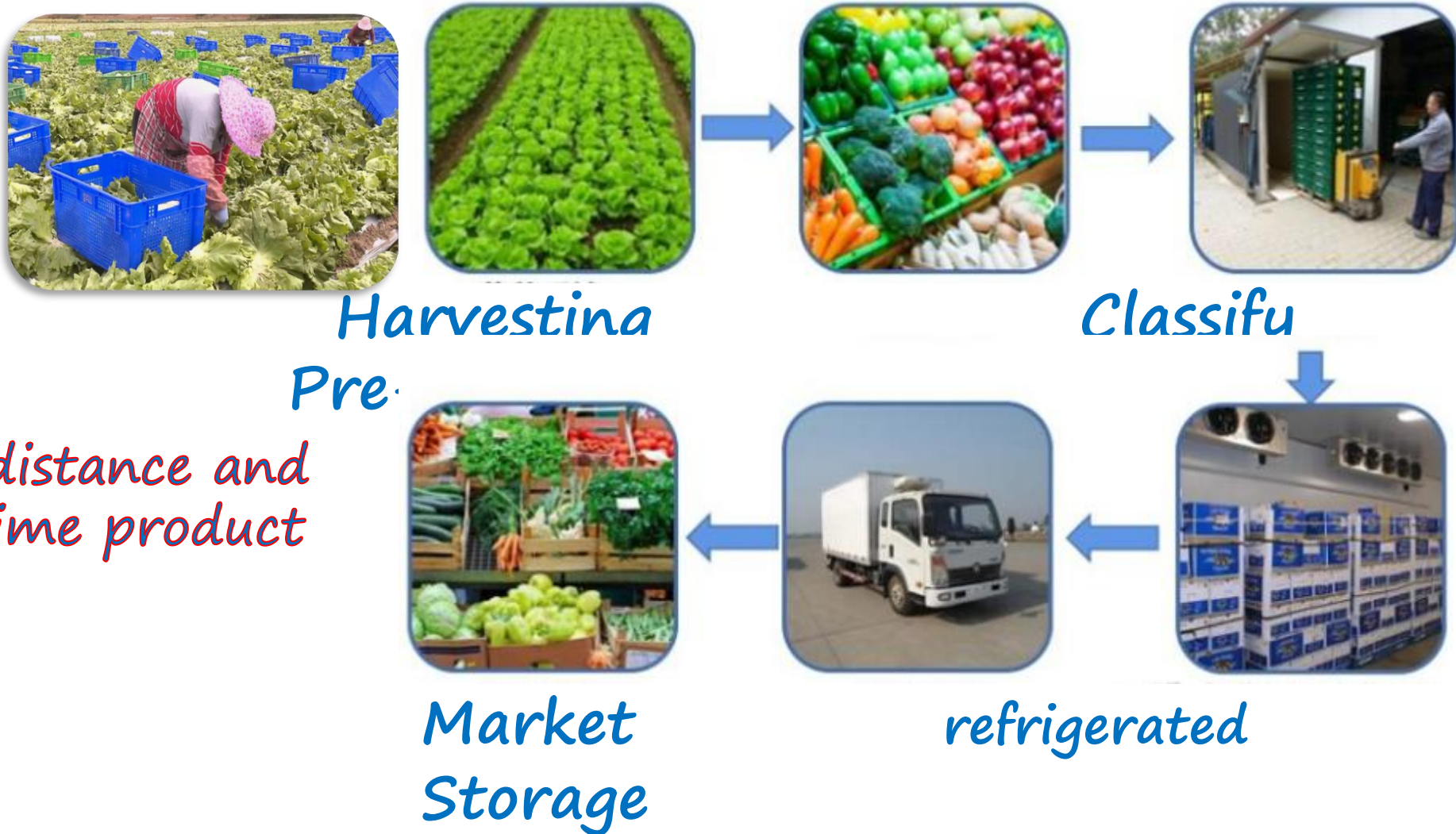


The framework of SFSC



Hoang, V. *Agronomy* 2021, 11, 2408.
<https://doi.org/10.3390/agronomy11122408>

The long food supply chain (LFSC)



- The quality of fruits and vegetables constitutes a dynamic composite of their physicochemical properties and consumer perception.
 - ✓ intrinsic characteristics inherent to the nature of the products, dictated by genotypic, agroenvironmental and postharvest factors, and
 - ✓ extrinsic characteristics influenced by socioeconomic and marketing factors which condition consumer perception of the products and formulate quality standards.
- The potential quality of fresh fruits and vegetables in the supply chain is defined in the period preceding harvest, however the full development of quality characteristics can be optimized through the use of appropriate postharvest technology.
- Postharvest recommendations for harvesting, packaging and handling produce along the supply chain aim at maximizing the period of acceptable quality.
- Storage and shelf-life extension are closely associated with the preservation of quality in fresh fruits and vegetables.

Good practice in supply chain

- ❑ Keep food safety and sustainability across the chain.
- ❑ Good Agriculture Practice(GAP), Good Supply Practice (GSP), Good Manufacture Practice (GMP), Hazard Analysis Critical Control Point (HACCP)are made in China to keep production high quality and good safety.
- ❑ More and more multi-stakeholder, like farmers/producers, market participants, are making a GlobalGAP Chain of custody mandatory. That means all links in the chain must be GlobalGAP certified.

Potential Sources Contamination: On the Farm

Animals and contaminated water implicated

Pre-harvest/harvest phases of production most likely opportunity for contamination

Post-harvest practices may contribute to spread

Pre-harvest/post-harvest sanitation treatments on produce – little effectiveness. Antimicrobial applications impact adequate reduction, quality implications

Frequent Contributors

Salmonella: cantaloupes, tomatoes, sprouts

E.coli O157:H7: leafy green vegetables

Cycolspora: raspberries

Hepatitis A: green onions

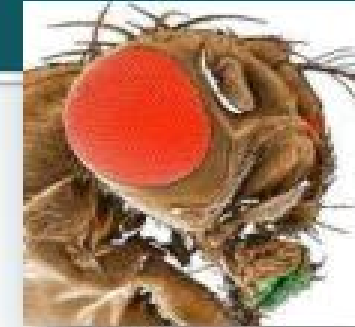
Listeria: Making a strong showing recently

Incubation Period

• Norovirus	12-48 hours
• Salmonella	6 to 72 hours
• E. coli O157:H7	1 to 10 days
• Listeria	3 to 70 days

Hygiene & Sanitation

- Safe sanitation, hygienic conditions and abundance with laws of food regulatory authorities is a must.
- Prudent care is applied to keep the fresh produce clean dirt, insect & microorganism infestation.
- All water used to be pre-treated.
- Anti fungal treatments are regularly applied.
- Between subsequent uses, the cold room space sanitisation is required.
- To identify and apply controls, HACCP (Hazard Analysis and Critical Control Points) procedures are useful.
- Regular internal quality audits, checks and training is a must.



03

The Contract Farming Model

The contract farming model: enterprise + cooperative/ agro-dealer+ farmer: "unified technology, unified standard and unified acquisition"

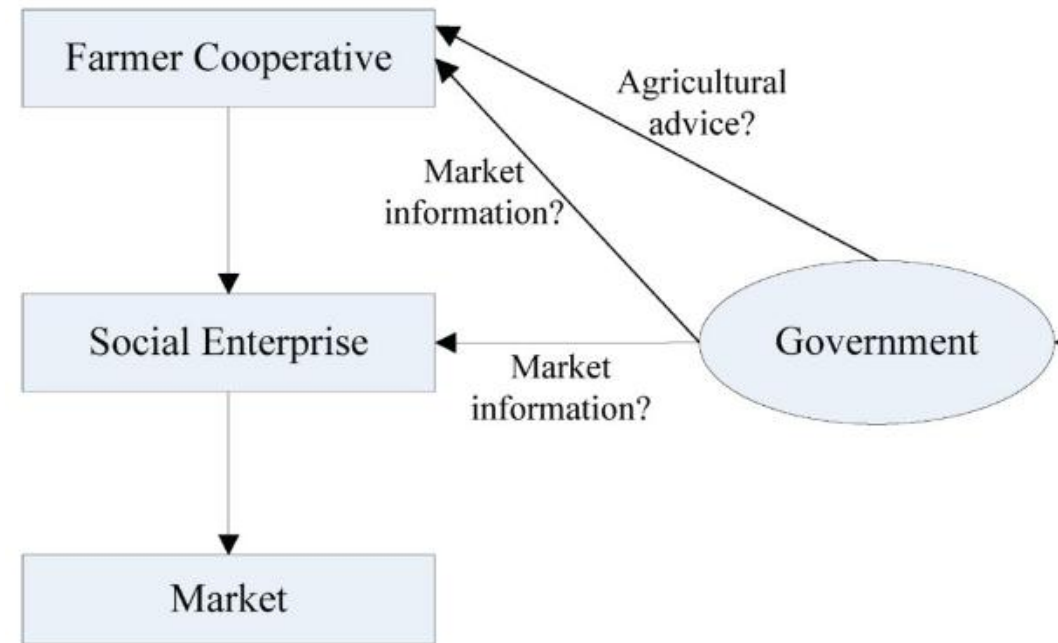
- The farmer cooperative plants certain types of agricultural products and the social enterprise, in turn, procures agricultural products from the farmer cooperative and then resells them to the final market.
- Since each farmer's planting scale is generally small, agro-dealers tend to sign contracts with many small farmers;
- Constrained by planting scale, technology and capital, farmers are usually in a weak position while negotiating with agro-dealers on the wholesale price of agricultural products.
- Many contract farmers choose to expand their planting scale because the contracts effectively solve the issues of selling agricultural products.



The contract farming model

- Farmer cooperatives play critical roles in the supply chains.
- Farmer cooperatives are facing many difficulties in China.
 - ✓ lack of technologies and systematic
 - ✓ hard to set reasonable selling prices
 - ✓ needs guidance from professional organizations.
- The supports from government are very helpful for both the farmers and farmer cooperatives.
 - ✓ The information provided by the government includes (1) information pertaining to agricultural products, such as the appearance, variety and quality; (2) market demand information for specific agricultural products; (3) other information such as logistics cost information and even weather information in selling spots.
 - ✓ Specifically, the market information (mainly including the price information and demand information of agricultural products)

- A vertical agricultural supply chain with one farmer cooperative whose decision variable is the agricultural product selling price and one social enterprise who distributes products and makes the order quantity decision
- The impacts of government intervention on selling price and the social enterprise's social responsibility concern.
- *The government also plays a critical role, in which it chooses whether to provide market information and agricultural advice to the farmer cooperative and/or the social enterprise, and may even intervene on the market price of the agricultural products.*



<https://doi.org/10.1080/00207543.2021.1924409>

Government support

1. Policy support
2. Financial support: such as lending policy, subsidized loans
3. Project support:
 - support the input of facilities and equipment for the pre-processing,
 - provide demand-related market information and production-related agricultural advice.
4. Change the sales mode of agricultural products, such as
 - Intensive planting
 - Online market
 - The model of 'enterprise + cooperative + farmer'

Government support

5. Agricultural insurance

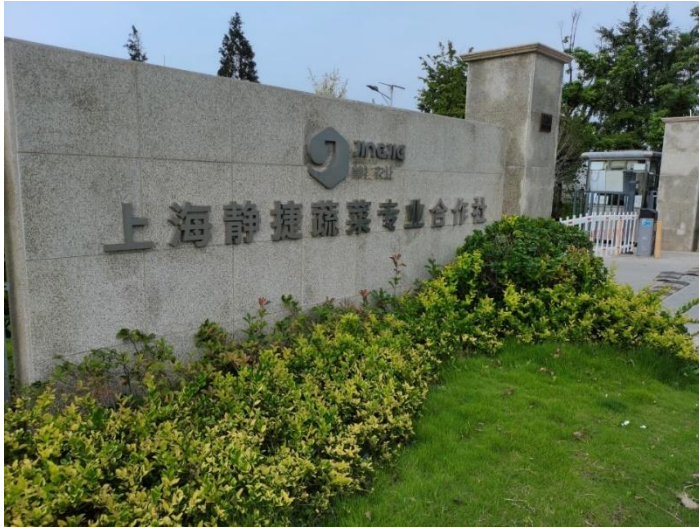
- Farm yields are vulnerable to weather, pests, and diseases, which leads to increased production risks. To encourage farmers to expand the planting scale, governments often encourage farmers to purchase agricultural yield insurance as a way to manage the risk of yield uncertainty.
- The insurance can stimulate agricultural development of small farms, thus increasing crop yields and quality, which the insured farmers tend to use less chemical fertilizer and pesticide in the planting operation.
- Agricultural insurance also affects the scale, structure, and green technology adoption of agricultural products by changing farmers' production decisions, thereby affecting the ecological environment.

Case:

- Coucou Catering Management Co., Ltd Hotpot is its main dish.
- The fruits and vegetables of the big restaurant such as Coucou Catering Management Co., Ltd are partly from the own production base and partly from the market.
- Some production bases are large enterprises, some enterprises use farmers' cooperative mode, which is “enterprise + cooperative + farmer”.



凑凑餐饮管理有限公司



Cooperative
Warehouse

Pre-processing



Customer/Company

Large wholesale market: collect, pre-process, turnover, customer





Acceptance standards for vegetables, fruits and seafood

Version: 2021-05-12

name	Specification requirements	picture	name	Specification requirements	picture	name	Specification requirements	picture
Spinach	Overall height 25-30 cm. The diameter of the stem is 0.3-0.5cm. The roots of made.		chrysanthemum coronarium	10-18 cm height. The maximum diameter of the whole dish is 0.3-0.5 cm.		Chive	Variety: 200 beans, rice green onion, black green onion. 25 cm height or greater. Spring onion rod diameter 0.3-0.8 cm.	
Romaine lettuce (Wrinkled leaf)	Overall height 20-30cm. Root flattening.		Malabar spinach	The height of the whole plant is 8-20cm. Remove roots and leaves with vine.		Coriander	Variety: Large leaf. 20-40 cm height. Stem diameter ≤0.3 cm Root length ≤1.5cm.	
Artemisia stem	Height (measure the length of stem after root removal) 20-30cm. The diameter of the stem is 0.3-0.5cm, the root is removed and flattened; unwashed. From July to September, hollow, white core and diameter exceeding 0.5cm		Chinese Cabbage	Varieties: Liangqing, 70, 80, Qingbai, gold Single weight ≥ 1500g.		Chrysanthemum	Annual 10/1 to 4/30, height 20-30cm. Annual 5/1 to 9/30, height 17-25cm. Root removal	

04

Chinese Food Safety Management System

Chinese food safety management system

- To assure the safety of food, the Chinese food safety management system have been constantly evolving and continuously improving since 1949. **The State Administration for Market Regulation** is to be responsible for the comprehensive supervision of the market, which includes monitoring and supervising the quality and safety of food and certification, etc.
- Chinese government proposed a “from farm to table” supply chain management model, which included certification, industry standard, legislation and regulation systems.
- According to the **Food Safety Law** issued in 2009, food safety regulators undertakes the obligation of supervising food producers, while companies bears the primary responsibilities for food safety in China .
- For food producers, government regulation is an external driving force to improve food quality.

Chinese food safety management system

- The 2015 Food Safety defines the scope of food safety governance in China, encompassing production and processing, sales and catering services, the production of and trade in additives and food-related materials, the use of additives and food-related products by food producers and traders, the storage and transport of food, safety management, additives, and food-related products.
 - ❑ concerning the food itself, the environment, food-related hazards, public health, education, consumer behavior, industrial management, regulatory systems, etc.
- *Since 2003, only after applying for the food production license, can food processing enterprises be allowed to enter the market for processing or trading.*
 - ❑ The “Administration of Food Production Permits” was approved by Food and Drug Administration in 2015, by the food production marked with “SC” Permit Code.
- The quality and safety of agricultural products are managed by the Ministry of

Agricultural products safety management system

The Law of the People's Republic of China on Quality and Safety of Agricultural Products, amended and adopted at the 21st Meeting of the Standing Committee of the Tenth National People's Congress of the People's Republic of China on April 29, 2006, is hereby promulgated and shall go into effect as of November 1, 2006.

Revised Draft was adopted at the executive meeting of the State Council on Sep 1, 2021

- Chapter I General Provisions
- Chapter II Quality and Safety Standards of Agricultural Products
- Chapter III Production Place of Agricultural Products
- Chapter IV Production of Agricultural products
- Chapter V Packaging and Labeling of Agricultural Products
- Chapter VI Supervision and Inspection
- Chapter VII Legal Responsibility
- Chapter VIII Supplementary Provisions

- One of the key points of agricultural product quality and safety supervision in 2022 is to promote the development of "San Pin Yi Biao".
- "San Pin Yi Biao" is a public brand of safe and high-quality agricultural products led by the government, which collectively referred to the Hazard Free Food Certification system, Green Food Certification system, Organic Food Certification system and Geographical

'San Pin Yi Biao' certifications



无公害农产品

Hazard Free agricultural products



有机农产品

Organic agricultural products indication Products



绿色食品

Green Food



农产品地理标志

Geographical

Thank You



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