



**Efforts to reduce Food Losses and
improve Food Safety
with utilizing Public-Private Partnership
in case of Thailand**

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Brief overview

- Thailand overview
- Agricultural Development Policy
- Food supply chain management in Thailand
- Factors effecting food losses and unsafe food
- Public- Private Partnership to reduce food losses and improve food safety
- Successful case of PPPs



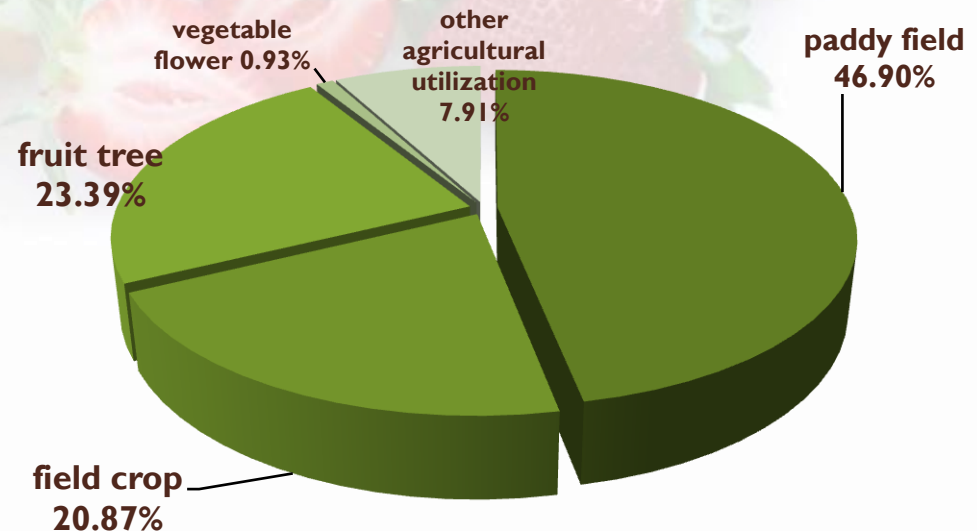
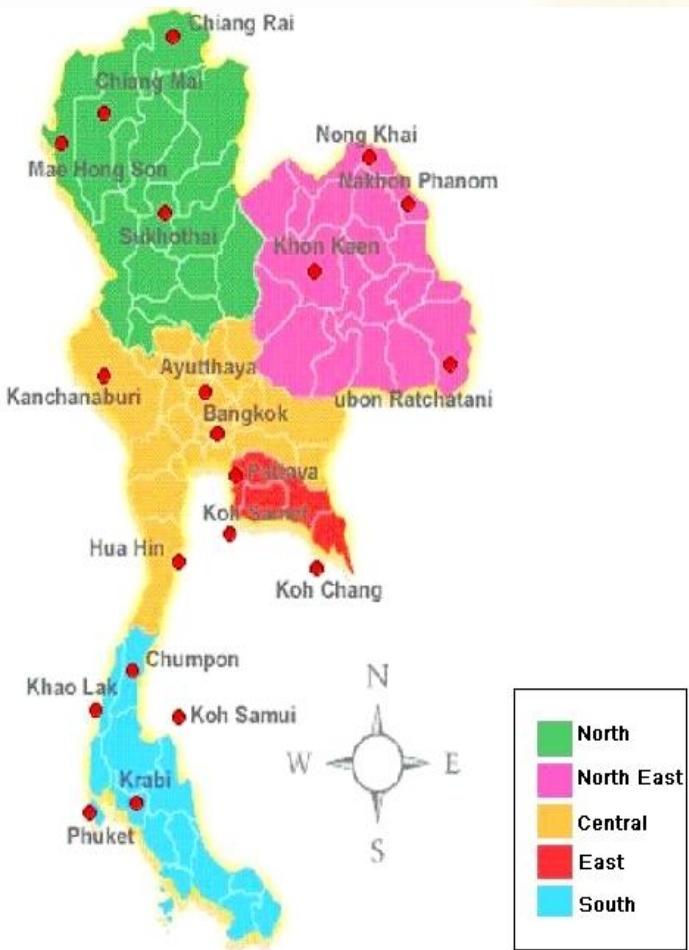
Overview



➤ **Thailand is a warm and humid tropical country**

➤ **Temperature 25°C-37°C**
Humidity 80-85%

➤ **Agricultural area is 46.54% of total land area**



Agricultural Development Policy

11th National Economic and Social Development Plan (2012-2016)



Vision :

“Good quality of life for farmers and national food security”

- Development of agricultural infrastructure
- Strengthening of the farmers
- Application of the sufficiency economy in agriculture
- Clusters development
- Food and energy security
- Creative agricultural economy
- Cool and green agricultural economy
- International cooperation
- Human resource development in agricultural sector



Strategic Framework on Food Security



Availability:

- ☐ Produce adequate food for sustainable domestic demand

Access :

- ☐ Encourage all Thai people at all time to access good quality and nutritious food

Utilization :

- ☐ Enhance good quality and safety food production, reduce food waste and promote appropriate food utilization

Stability:

- ☐ Promote sustainable use of natural resources for food production



Utilization:



- ❑ **Enhance good quality and safety food production, reduce food waste and promote appropriate food utilization**
- 1. Support food standard and food safety throughout the supply chain**
 - 2. Promote consumption of nutritious diet**
 - 3. Reduce food loss in consumption stage and post - harvest loss**
 - 4. Develop agricultural information system and access to information**





Food Supply Chain Management in Thailand



Supply chain management system

1. **System I :Traditional system**
2. **System II: Cooperation system**
3. **System III: Royal Project**



I. Traditional supply chain system I

grower

middleman

wholesale market/
modern trade

Supper market

Retail market

consumer



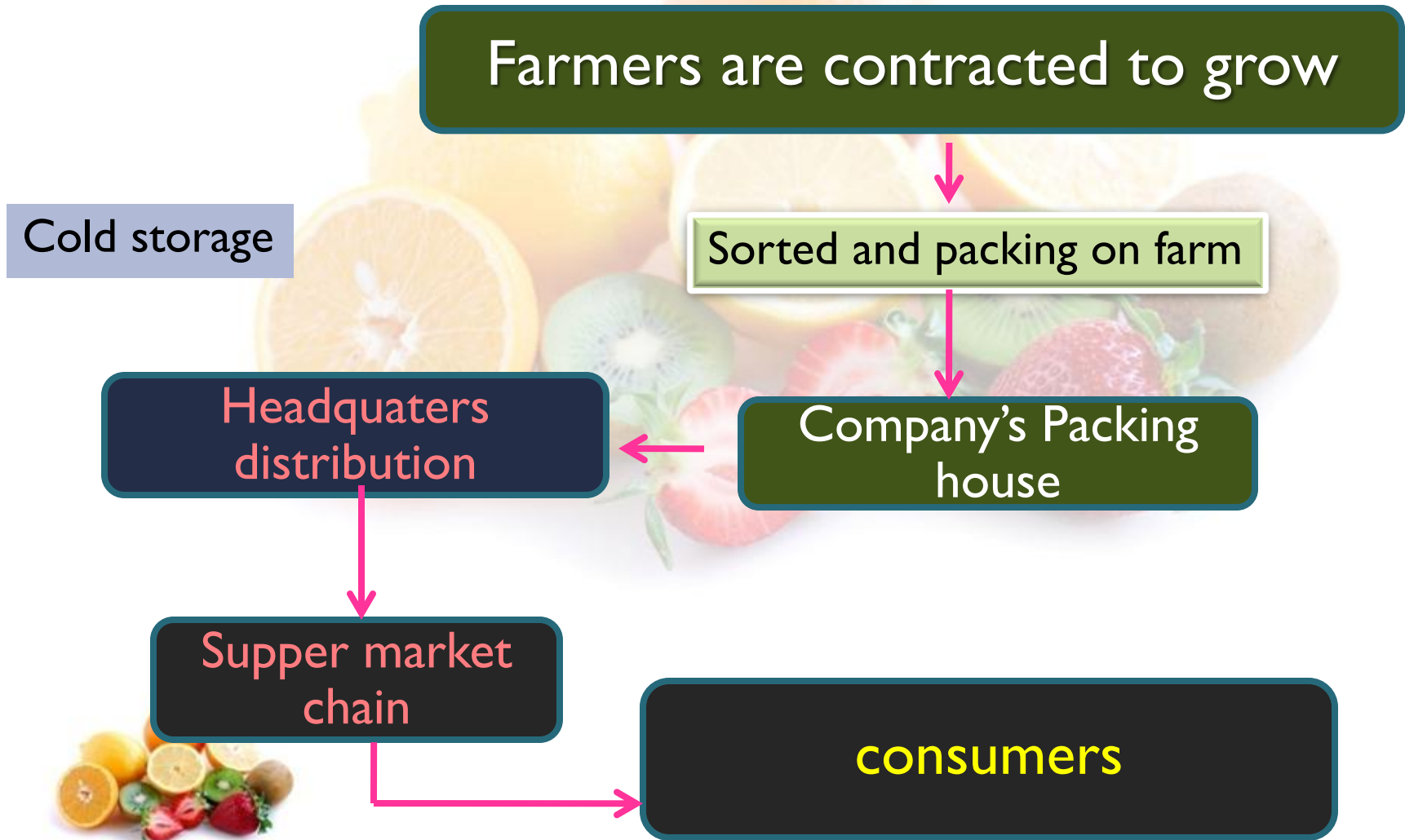
Mango supply chain



Photo source:
Thailand Postharvest
Technology
Innovation Center

www.phtnet.org

2. Cooperation supply chain system (Private sector- initiated supply chain)



3. Private- sector system

Growing area: Nongkhai province

Postharvest handling at farm level



Planting without ramp



Matured tomatoes



Harvesting by hand



Selected tomatoes
for industry used



Shaded area,
sorting and grading



Transportation from field

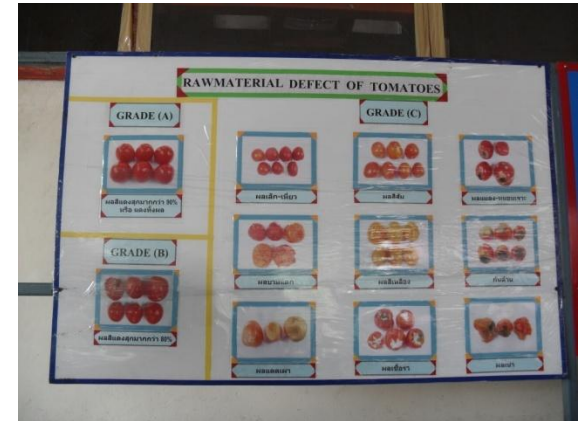
Postharvest handling at manufacturing level



Receiving area



Harvested tomatoes



Grading and pricing



Factory manager
and field manager



Processing factory



cleaning

3. Royal Project system (Public sector initiated vegetable supply chain)



Harvest handling with care under project researcher recommendation



greenhouse



Project researchers



Cutting by scissor



Sorted tomatoes



Sorting and cleaning
at farm



cutting

Transportation to Chiangmai collection center



Transport form collection center



Packing house in Chiangmai



Transportation to Bangkok,
regional markets



Products Processing plant in Chiang Mai

Factors effecting Food losses and Food Safety



Consumer rejection

Inferior quality

Inadequate Policies(programs, plans, regulation, price, information

Factors of Food Losses

Socio-economic factors (attitude, custom, income, credit and education)

Adverse weather/
Oversupply

Inefficiencies in infrastructure, distribution, and transportation



Nature Causes of Food losses in Thailand (losses in qualities)



➤ **Physiological factors**

Transpiration, Respiration

➤ **Biological factors**

Microorganism, Insect pest

➤ **Environmental factors**

Light, Temperature, Relative Humidity, Rainfall.

➤ **Mechanical factors**

Agricultural equipments.

➤ **Chemical factors**

Pesticides



In Thailand,

Postharvest losses in vegetables are about 30%

Postharvest losses in fruits are about 20-50 %
depending on kinds of fruits

Postharvest losses can
occurred at every steps
along supply chain.



In Mandarin (Sai Num Pung)

- Harvest 43.7%
- Packing house 17.3%
- Transportation 19.7%



Quality loss

at the orchard

- Anthracnose disease 62.8%
- Fruit cracking 12.5%
- Fruit bruising 9.4%
- Other 15.3%

=lose 23,463* million baht/year

* 40 baht/kg



Colletotrichum gloeosporioides

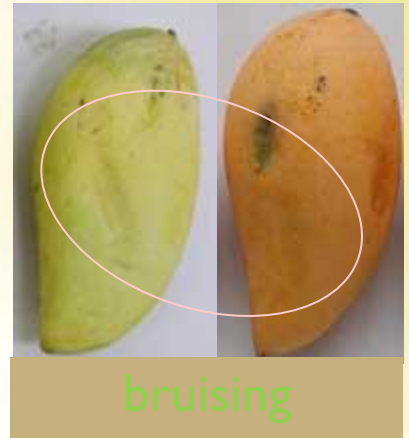
Anthracnose disease

source: Sa-artsood et al., 2005

Photo source: www.phtnet.org

Quality loss during transportation

- Bruising 45.6%
- Anthracnose disease 44.3%
- Ooze sap 5.8%
- Other 4.3%



=lose 30,675* million baht/year

* 40 baht/kg



Quality loss

at the market



- Anthracnose 63.2%
- Bruising 29.0%
- Other 7.8%

=lose 19,758* million baht/year
(* 40 baht/kg)



Premium mango for Thai market

Causes of unsafe food :

- **Biological hazards**
- **Chemical hazards**
- **Physical hazards**



Food safety hazards can contaminate food at any stage in the food chain from production through harvesting, storage and transportation.

Unsafe Food can cause losses of opportunities, prestige, lose of market access, market credibility, lose of investments and government had to increase health care cost



Strategies of the National Food Safety program



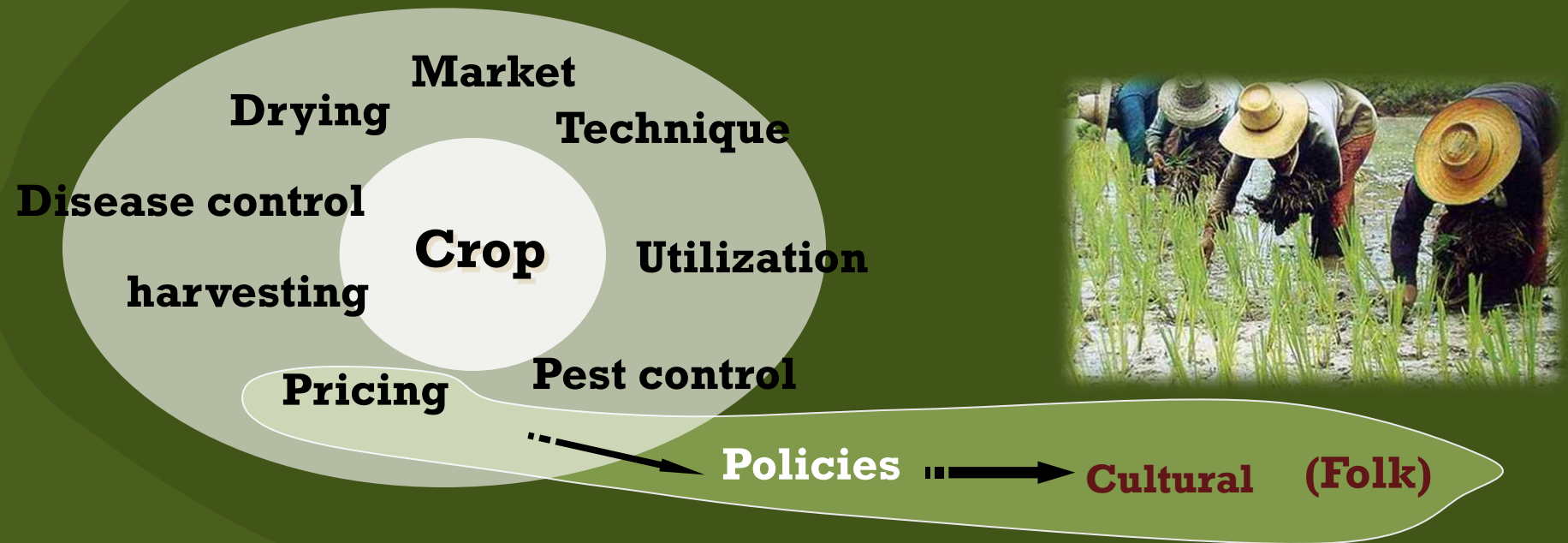
1. Development of regulatory measures to comply with international food standards
2. Strengthening of food safety monitoring and risk management system.
3. Empowerment of consumers
4. Capacity- building and information – networking
5. Development of laboratory capability



The commodities system including.



- Production
- Marketing
- Utilization of the products



Public- Private Partnership to reduce food losses and Improve food safety



Scope and nature of public –private cooperation in agricultural sector

- **Recent policy and strategy of PPPs in Thailand's agribusiness sector have been centered on R&D .**
- **Generally R&D ,to reduce food losses and improve food safety are related to the controlling systems and management.**





Controlling System To Reduce food losses and Unsafe food

Using three major components

GAP (Good Agricultural Practices)

GMP (Good Manufacturing Practices)

HACCP (Hazard Analysis and critical Control Point)

At each component we can do controlling both prevention and decontamination



Fruit fly control

- Pre-harvest

- Bagging
- Pesticide



- Postharvest

- Hot water/ vapour heat treatment



Needs for Reduction of Post-harvest losses

- Providing cold storage or cool chains transportation facilities.
- Initiate and coordinate awareness programs for producers, dealers and transporters on postharvest handling
- Introduce packaging techniques with modern packaging material.
- Support research in the area of value addition and supply chain management.



Public- Private Partnership (PPP) Cooperation to Reduce Post- harvest Food losses and Improve Food Safety



Agricultural Supply Chain	Possible PPP's Project	
	Food losses	Food safety
Farm level : <ul style="list-style-type: none"> - planting variety - soil property - water - fertilizer - pest control 	<ul style="list-style-type: none"> •Development of seed resistant to disease or insect • Development of test kit for disease screening 	<ul style="list-style-type: none"> •Development of bio-pesticide or bio-agent to replace chemical used
Harvesting level: <ul style="list-style-type: none"> - proper harvested equipments - timely harvesting 	<ul style="list-style-type: none"> •Develop the proper harvested tools for each crop. • Develop harvesting index for each crop 	

Continue:



Food Supply Chain	Possible PPPs Projects	
	Food losses	Food safety
Post harvest Handling: <ul style="list-style-type: none"> - sorting - cleaning - storage - packaging - transportation 	<ul style="list-style-type: none"> • Packing house with the cold storage room . • Packaging techniques/materials • Transportation (refrigerated /non refrigerated) 	<ul style="list-style-type: none"> • washing /cleaning container or conveyors in cooperation with the public research for sanitation and hygienic practices • Laboratories for analysis of pesticide residues, heavy metal , mycotoxins and microorganisms
Marketing : <ul style="list-style-type: none"> - re-packing - loading/unloading - storage 	<ul style="list-style-type: none"> • Proper packaging material for long shelf life 	
Processing plant: <ul style="list-style-type: none"> - sorting - processing 	<ul style="list-style-type: none"> • utilization of waste as fertilizer or packaging material • build up manufacture 	<ul style="list-style-type: none"> • physical hazards detector • Rapid test kit for mycotoxins detection



Example of PPPs ,Thailand case to reduce food losses and improve food safety :

Case	Private partner	Public partner	Nature of public support	Nature of private support
Creating a disease-resistant okra seed variety	Uniseed Co. Ltd.	BIOTEC	Funding of 15 %, laboratory services	Funding of 85% staff time for yield trials
Biotechnology for the detection of white leaf disease in sugarcane	Mitr Phol Sugarcane Research Center, a subsidiary of Mitr Phol Sugar Group	BIOTEC	Full funding for research, loan for 20 % of project costs, laboratory services	100% of project costs in second phase

Continue :



Case	Private partner	Public partner	Nature of public support	Nature of private support
Technology for detection of several virus in orchid	Cepact Inter Co, Ltd	ARDA	Full funding for research	100% of project costs in second phase
Production Aflatoxin ELISA test kit	Saim Inter Quality Co. Ltd.	DOA	Full funding for R&D	100% of project costs in second phase
Technology to produce high quality and safety hairy basil seed for export	Thai Commodities Co. Ltd. Patchara Transworld Co. Ltd Thai cereal world Co.ltd	DOA	Full funding for R&D 50% funding for laboratory services	50% funding for laboratory services

PPP's case I

Public sector

Department of agriculture (DOA), MOAC

Problem : Aflatoxin contamination in food and feed of both domestic consumption and export.

Private sector

Need rapid and accurate detection test kit with low cost for screening their products before processing.

Project : Production of ELISA test kit for detection of aflatoxin in Agricultural commodities



**Aflatoxin ELISA Test kit
R&D by Department of
Agriculture (DOA)**

**National Innovation
Agency (NIA)
coordinator and
support private sector
investment**

**Transfer
technology to
Private sector**

**Production
Quality control
by DOA**

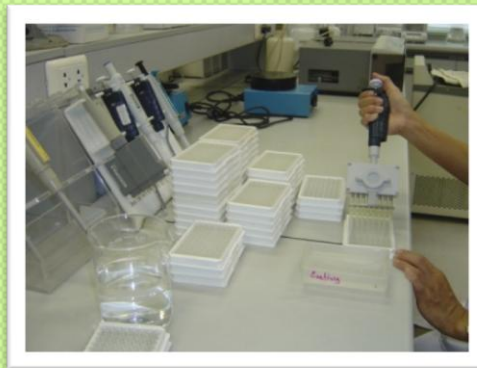
**Commercial
production of
Test kit**

**Distribution
to
customers**

- Food and feed manufactures
- Food and Drug administration
- Researchers
- Food safety concerning public and private sectors
- export to neighboring country



Transfer technology from R&D to private sector



Training the users both public and private sector

Stakeholders responsibility to reduce food losses and improve food safety



Thank you



PPPs



High quality
And Safety food

