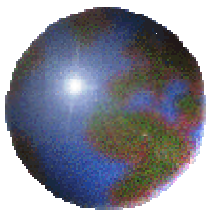
The Chinese Ecological Agriculture: Development Strategies, Typical models & Technologies



Prof. Wu Wenliang
College of Resource and Environment
China Agricultural University
wuwenl@cau.edu.cn
wuwenl-66@163.com

Main Contents

1.Definition and Characteristics of Chinese Ecological Agriculture(CEA).

2.Models of Chinese Eco-agriculture

3.Eco-agricultural industrialization development perspective

1.Definition and Characteristics of Chinese Ecological Agriculture(CEA)

(1)The definition of the Chinese eco-agriculture

Chinese eco-agriculture is a new integrated agriculture system which integrates agricultural production, rural economic development, environmental improvement and protection, resources fostering and using together effectively.

(2)The Characteristics of CEA

1). **Development objectives**. It aimed at harmonizing the human being and nature; facilitating the sustainable development of agriculture, rural economic development and social development ; and, achieving the integrated decision-making of multiple objectives.

2). Eco-technologies. It requires to achieve the optimization of the whole agriculture technical system and to exert the advantages of the integrated technologies through a series of typical eco-engineering models.

3). Production structure. It specially emphasis the structure optimization of agriculture, forest, animal husbandry, fishing and side occupation, and strengthen of their linking, so it develops the integrated agriculture system of eco-economic optimized and facilitated each other.

(3) The phases of Eco-agriculture

Phase 1,from the end of 1970s to the mid of 1980s. Its start mainly focused on studying and small scale experimental unit.

Phase 2,from the mid of 1980s to early 1990s. It focused on establishing agricultural village and farm unit and study on eco-engineering models and special technologies. And, the research on pilot eco-agriculture county was initiated.

Phase 3, since the early 1990s. The construction of the pilot eco-agriculture county was initiated .

Phase 4 ,Since 2000. Eco--industrialization

(4) The main achievements of eco-agriculture in China.

1)To advance sustainable healthy development of agricultural and rural economy

2) To raise the agricultural resources use efficiency and improve the eco-environment.

3) The pilot eco-agriculture counties play a considerable pilot role.

4)To strengthen the consciousness of eco-environmental protection and bring good social effects.

5) To form many good eco-agriculture models and eco-technical systems.

2.Models of Chinese Eco-agriculture

（1） The construction models of the Pilot Counties

(2) The typical model of Eco-Agricultural Engineering

（1）The construction models of the Pilot Counties

- **Models in Fragile Ecological Zone**
- **Models in Plentiful Eco-resources Zone**
- **Models in Main Grain Production Zone**
- **Models in Developed Coastal and Suburban Zone**

General Model of the pilot counties in Ecological Fragile Zone

Fragile Ecological Zone mainly includes the upstream regions of Yangzi River and Yellow river, the windy and sandy north area and other regions which have more mountains and plateaus area. The pilot counties in the Zone have poor natural and economic conditions.

The basic model is the three approaches of treatment and structure Optimizing:

General Model of the pilot counties in Ecological Fragile Zone

Firstly, it should improve the exasperated eco-environment, especially recover vegetation;

Secondly, it should emphases the agricultural infrastructure construction, especially the basic farmland construction;

Thirdly, it should optimized the agriculture produce structure, especially raising the yields of cereal crops and reducing the area of cereal crops, expending the area of forest, fruits and animal husbandry.

General Model of the pilot counties in Plentiful Eco-resources Zone

The pilot counties in Plentiful Eco-resources Zone have poor traffic and economy, but have rich natural and ecological recourses.

The basic model is the three approaches of Eco-agriculture protection and industry development:

Firstly, protecting the eco-environment and natural recourses, and keeping the superiority of eco-agriculture;

Secondly, strengthening the agricultural infrastructure construction;

Thirdly, developing the characteristic agricultural products and develop the eco-industry.

General Model of the pilot counties in Main Grain Production Zone

Main Farm Production Zone mainly lies in plain where main products, such as grain, cotton and oil crops are scoping. The pilot counties in the Zone have the developed planting and animal breeding, and have a developed mechanizing, intensive and scoping agriculture industry.

The model is to form a benign circulation of the industrialized farming management by combining farming with breeding and processing, and to establish an agricultural industry system with efficient resources using.

Model of the pilot counties in Developed Coastal and Suburban Zone

The pilot counties lie in the coastal and suburban areas, which having higher agricultural industry level, higher technology level and developed economy, which stand for the higher development level of Chinese agricultural modernization.

The main problems are the high inputs, high cost of the labor force and the agricultural environment pollution.

Meanwhile, due to its good locations and big markets, it's suit for developing the high quality agricultural products.

The model could be named Technology Leading model.

(2) The typical models of Eco-Agricultural Engineering

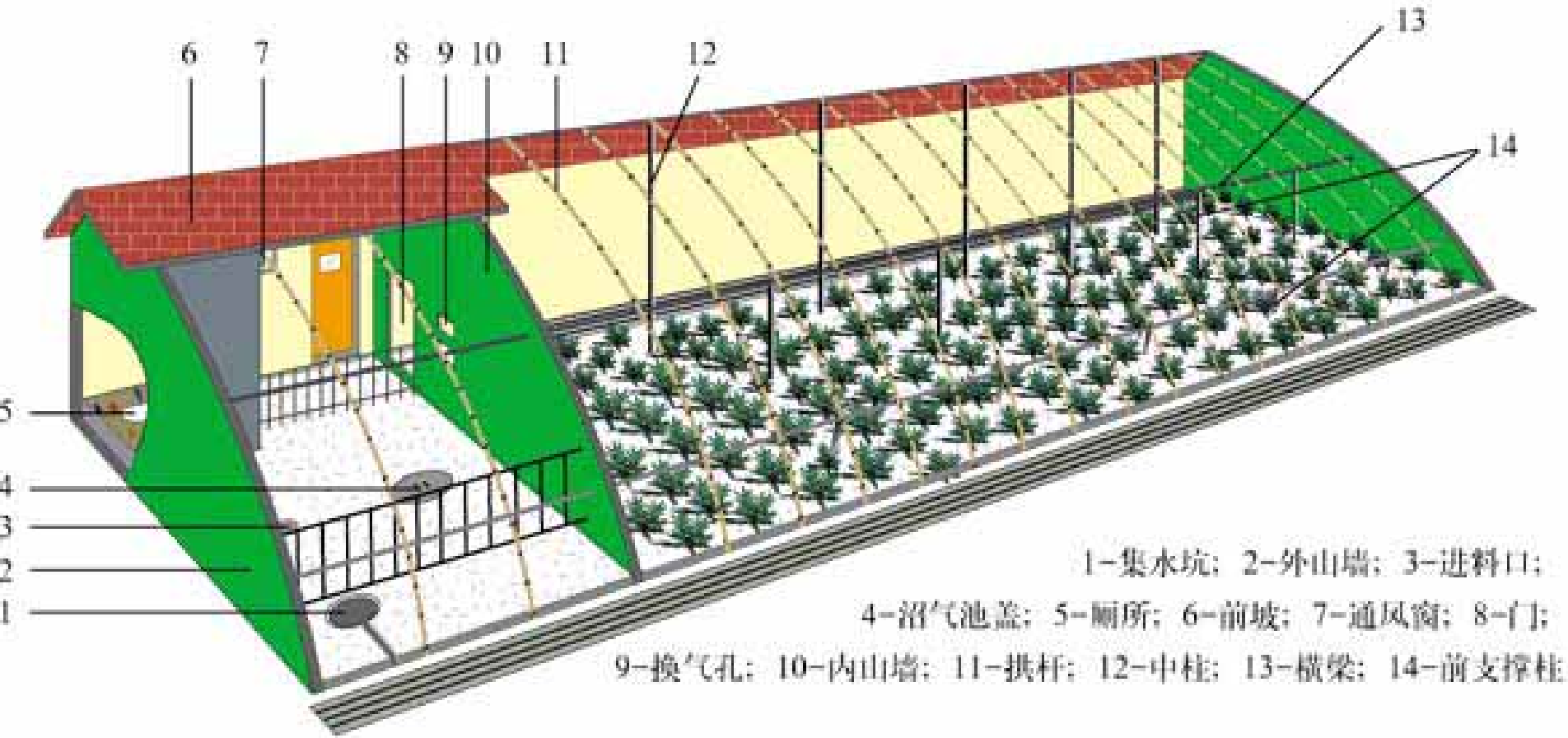
No.1 The Quaternary model in North China(four in one)

Biogas generating pool, pig house and vegetable are assembled in solar greenhouse.

The solar greenhouse provides feasible temperature and moisture for biogas generation, pigs and vegetable, and the pigs can raise the temperature in solar greenhouse. The respiration of pigs and burn of biogas produce carbon dioxide to vegetable, which could increase the yield of fruit vegetable by 20%, or of leaf vegetable by 30%.

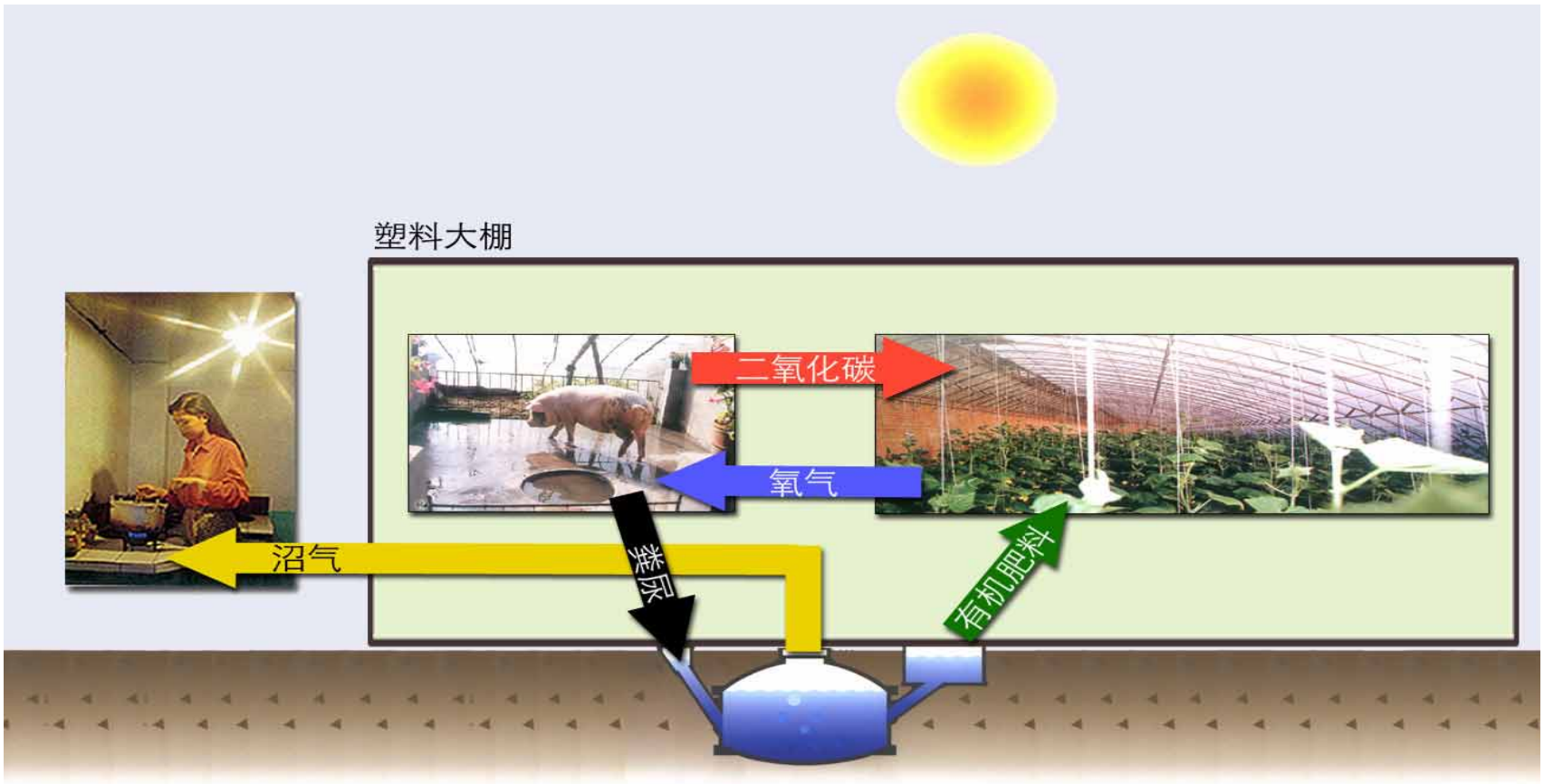
In common, one household can raise 10 pigs, plant 150 square meter vegetable, and produce 300 cubic meter biogas per year. The average income raises is 3500 RMB per year.

The diagrammatic representation of the Quaternary model(4 in 1) in North China



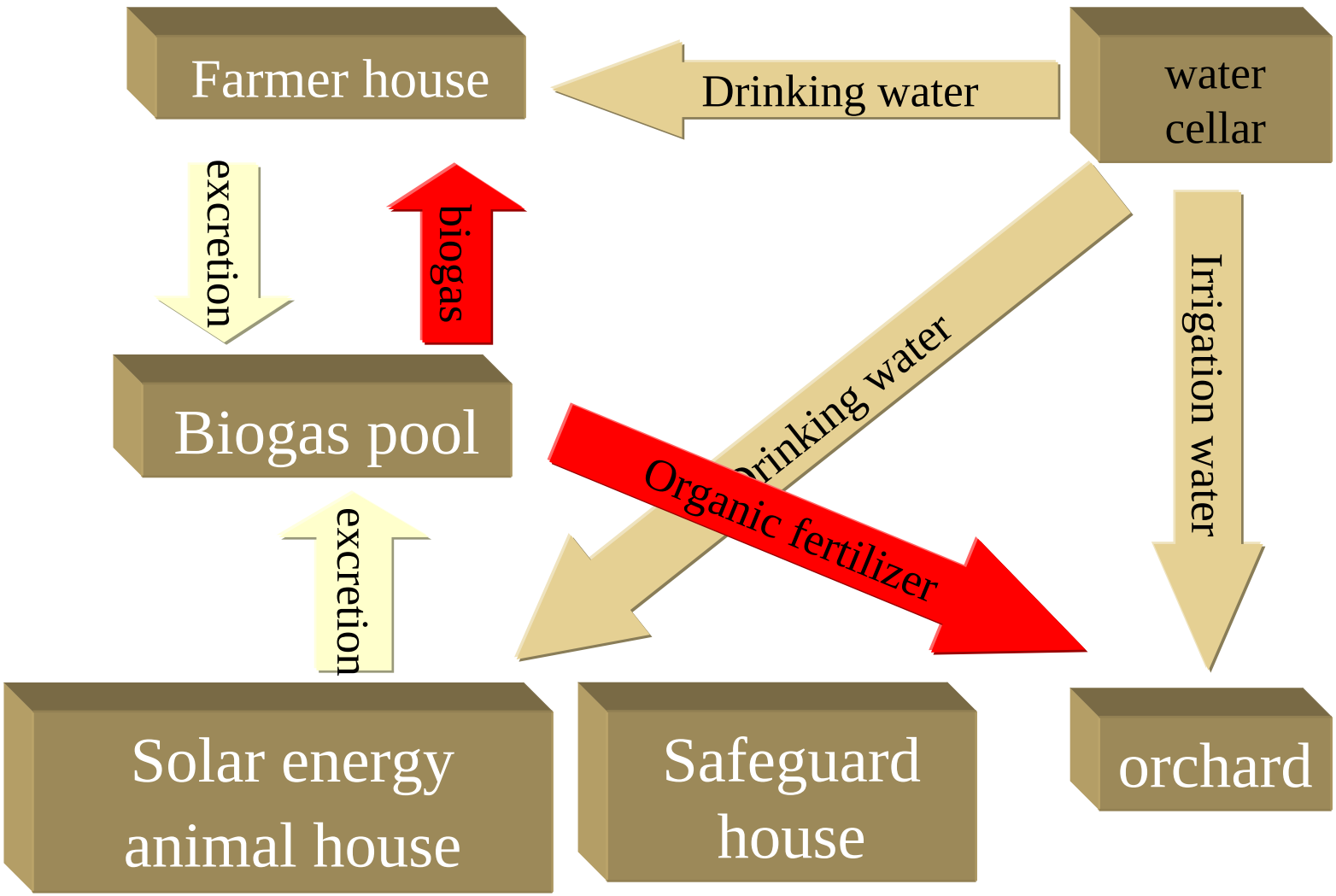
"四位一体"能源生态模式结构示意图

The composition of the Quaternary model in North China



‘Five in One’ model in Northwest China

The composition of ‘Five in One’ model in Northwest China



No.2 ‘Pig-Biogas-fruit tree (or rice, vegetable, fish) ’ model in South China

Leading by animal husbandry, biogas production combined with foodstuff, sugarcane, tobacco, vegetable, fruit, fish and other production.

The core of this model is the biogas production pool. The excrement of human and pigs can be converted to biogas. Residue of biogas production can be used to plant fruit tree, fish, pig and vegetable.

No.2 ‘Pig-Biogas-fruit tree (or rice, vegetable, fish) ’ model in South China

More similar models can be found in ‘pig-biogas-fruit tree’ in Ganzhou,Jiangxi province; ‘pig-biogas-rice’ and ‘pig-biogas-vegetable’ in South China.

Every household can produce 300 cubic meter biogas per year, which cuts down the cost 150 RMB and the saving of fertilizer and pesticide can cut down 350RMB.The income can increase 1500RMB from the improving of quantity and quality of products.

The net income of a household will be increased 2000RMB per year.

The exhibition of 'Pig-Biogas-Fruit' Model in South China

3.Eco-agricultural industrialization development perspective

- (1)comparative advantage
- *(2)*the inspiration from international organic agriculture
- （3）The means and measures to joint with the international society

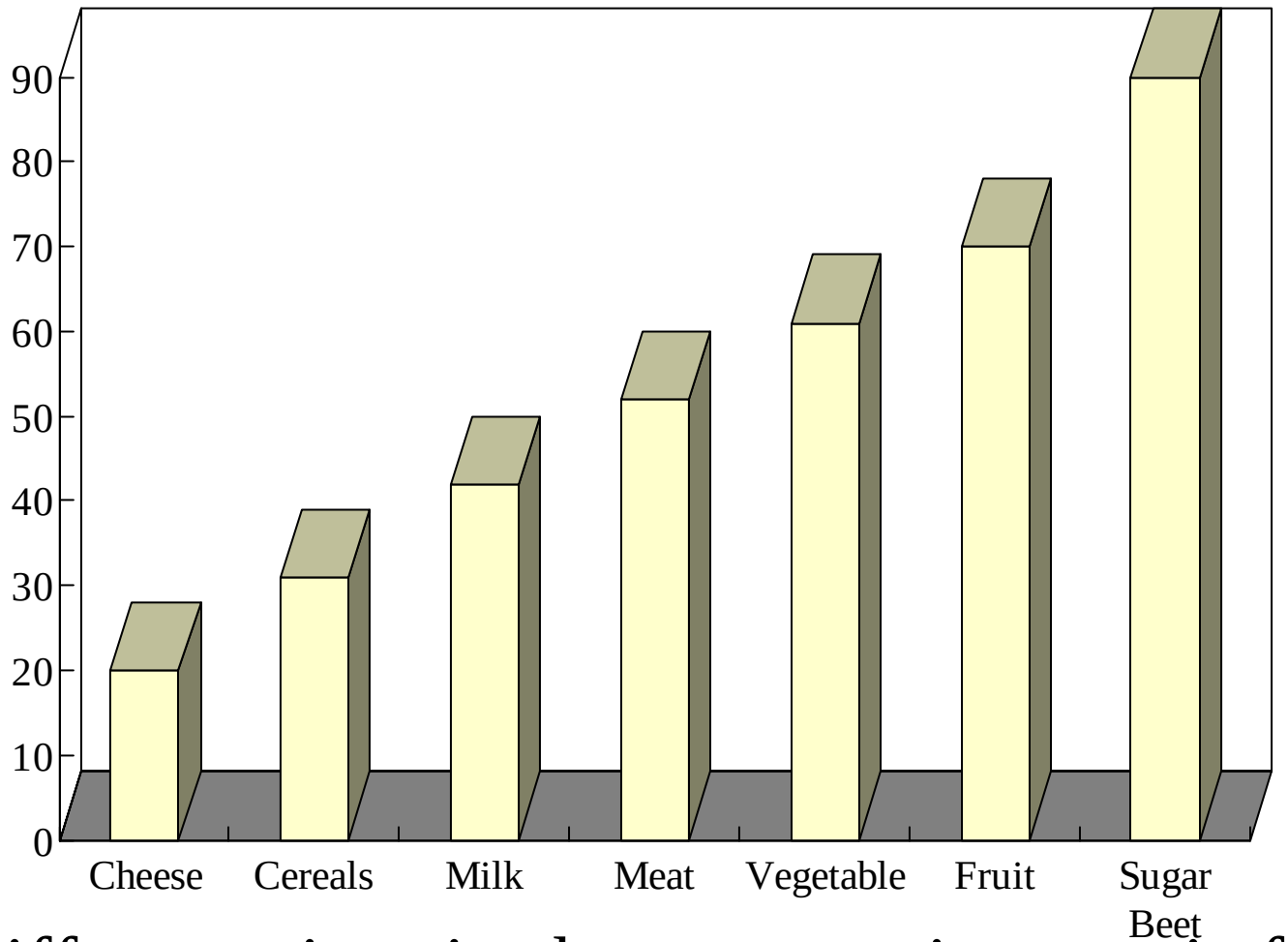
(1)China has a considerable comparative advantage in developing green or organic foods.

1)Excellent ecological environment in some parts of the western region.

2)Advantages in work labour

3)Construction of eco-agriculture.

4)Develop organic and green food bases



The difference in price between main organic farm products and conventional farm products in Europe

(2)the inspiration from international organic agriculture

1)non-pollution (product, environment,input）

2)Market orientation（local, region, globe）

3)institutionalization（standardization—EU, America, Japan, UN, IFOAM）

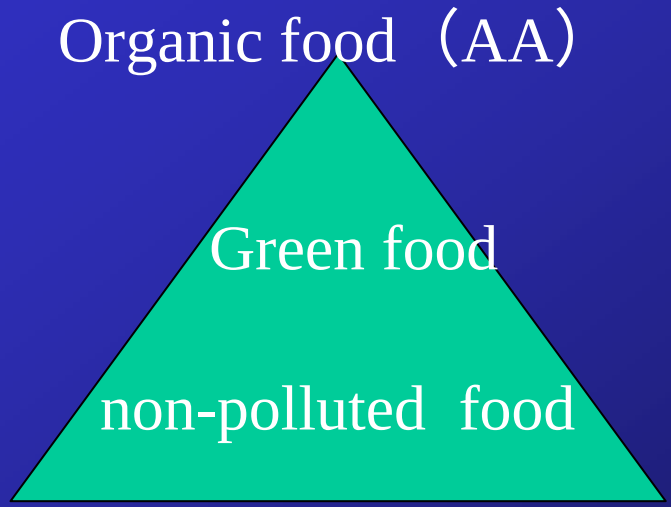
4)Industrialization (variety, input, growing, fostering, processing, service-authentication, consultation and symbol, etc)

5).internationalization（standard, market)

（3）The means and measures to joint with the international society

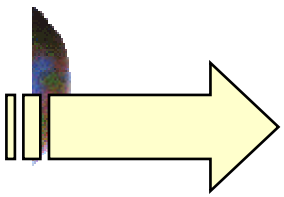
conceive the basic structure of green & organic food industry .

- **Build a structure system including three levels ：**
- **Eco-agriculture produces non-polluted food；**
- **Then it produces green food after being improved(A level）**
- **Subsequently it produces organic food after being further improved .Both organic and green food can be directly developed.**



Eco-agriculture

- non-polluted farm products
  - Green food



- Organic food（farm products）

The symbol product of ecological agriculture

contact:

- **Prof.Wu Wenliang**
- **College of Resource and Environmental Science ,China Agricultural University,**
- **100094**
- **Tel：0086-10-62732387 or 0086-10-62732498**
- **Email：wuwenl@cau.edu.cn**
- **wuwenl-66@163.com**