

Comparison and Experience Reference of Pork Supply Chain between China and Vietnam on the Basis of Food Safety Security

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Abstract The paper aims to conduct a comprehensive analysis of theoretical model and practice on the pork supply chain of China from the perspective of logical consistency while laying emphasis on the nodes of pork supply chain and the value distribution of value chain. First of all, analyze the conceptual model of pork supply chain in China and further characterize each node of the supply chain as well as the link between the nodes. By comparing with the pork supply chain in Vietnam, analyze the characteristics and existing problems of the pork supply in China. Finally, give advice and suggestions from the aspects of supply chain process reengineering, food quality supervision and the policies & regulations *etc.*

Key words Pork supply chain, Vietnam, Value chain, Food safety

1 Introduction

As important agricultural product, pork is the primary source of meat consumption for urban and rural residents in China. The price of pork has an impact on the food consumption expenditures of urban and rural residents, and the safety of pork products also connects with the health and life safety of people. Therefore, the research on the pork supply chain and value chain in China will help the government to better regulate the market, prevent high volatility of market price, ensure food safety and increase rural income.

Scholars at home and abroad have made great research achievements in the field of pork supply chain. Sun Shimin *et al.* pointed out that high quality pork supply chain has 5 significant features, namely biological source materials and products, highly difficult logistics control, limited time competition, complex constituent subjects and guaranteed quality safety^[1-2]. Through the investigation on the pig supply chain in Poyang Lake Eco-economic Zone, Gao Kuo and Gan Xiaoqing have summarized the pork supply chain model of this region^[3-4]. Most scholars have focused on the upstream nodes of the pork supply chain, which is the relationship between scattering raising – households and companies. Through investigation and study, the Division of Rural affairs under Henan Provincial Policy Research Office of the Communist Party of China have summarized 5 basic forms of "Companies + Peasant households", including "Circulation enterprises + Peasant households", "Processing enterprises + Peasant house-

holds", "Professional associations + Peasant households", "Specialized cooperatives + Peasant households" and "Leading specialized households + Peasant households"^[5]. Jiang Boying believes that "Companies + Peasant households" is a market-oriented economic community that takes companies as the as the lead and regional economy as the foundation with the intent to scale up the operation, build the bridge for small peasant households to access to large markets and promote the integration of manufacturing and marketing. He has summarized 4 models of "Companies + Peasant households"^[6]. According to the nature of the companies or entities contacted by peasant households, Ji Jinshan has classified "Companies + Peasant households" as "Circulation enterprises + Peasant households", "Processing enterprises + Peasant households", "Professional associations + Peasant households", "Grass – root communities (units) + Peasant households" and "Leading specialized households + Peasant households"^[7]. In this paper, we will build the model of pork supply chain in China on the basis of previous studies and describe the pork supply chain in China according to the statistical data and practice situations. Later, through the comparison with the pork supply chain in Vietnam, we will analyze the existing problems of the pork supply chain in China and bring forward policy suggestions.

2 Practical significance of pork supply chain in China

In the global meat consumption of the early 21st century, pork, poultry and beef account for 36%, 33% and 24% respectively. In China, pork accounts for an even greater proportion in meat consumption. The proportions of pork, poultry and beef are 71.8%, 15.7% and 9.8% respectively. The annual percapita pork consumption has increased from 18.2kg in the 1980s to 34.3 kg in the early 21st century (Table 1). (FAPRI)

The price of pork has an impact on the food consumption expenditures and consumption demand of urban and rural residents. According to the data of The Food and Agricultural Policy Research Institute, the income demand elasticity of rural area is

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greater than that of the urban area in China at present, while the price demand elasticity of rural area is the same as that of the urban area (Table 2). Research shows that 70% of the live pigs in China come from the scattering raising-households, 25% of them come from the specialized households, and the remaining 5% come from large-scale pig farms. Therefore, pig-raising is one of the important ways to increase farmers' income, and the price of pork will affect the income level of farmers to some extent.

Table 1 Percapita meat consumption level in China from the 20th to 21st century Unit: kg/person/year

Variety	20th Century			21st Century
	Late 1980s	Early 1990s	Late 1990s	
Beef	0.8	2.1	3.6	4.7
Pork	18.2	24.7	29.8	34.3
Chicken	1.8	4.1	6.8	7.5
Total	20.8	31.0	41.3	47.8

Data source: The Food and Agricultural Policy Research Institute (FAPRI), the same as Table 2.

Table 2 Income demand elasticity and price demand elasticity of pork in China in 2011

Type	Region	Elasticity
Income demand elasticity	Urban	0.10
	Rural	0.12
Price demand elasticity	Urban	-0.3
	Rural	-0.3

Furthermore, the safety of pork products is critical to the health and life safety of people. But due to the small scale, systematization and normalization of pig industry in China combined with the incomplete enterprise credit system, imperfect construc-

tion of food safety rules and standards and backward supervisory measures, the safety problems of pork products emerge in an endless stream under the driving force of interests.

3 Conceptual model and current situation of pork supply chain in China

3.1 Conceptual model of pork supply chain in China The upstream nodes of pig supply chain mainly include piglet suppliers, feed suppliers, anti-epidemic suppliers and raising households. Pig raising nodes mainly consist of pig raising companies and scattering raising-households. Generally, there are three kinds of relations among the pig breeding units: (1) mutually independent; (2) mode of "Enterprises + Cooperative organizations + Bases + Peasant households"; (3) mode of breeding associations. In this mode, pig purchasers and pig agents look for the source of goods together and deliver the live pigs to the slaughter plants for slaughtering. Part of the pork will be sent to the processing enterprises for further processing, and part of it will flow into the market in the form of fresh meat. In rural areas, pork will be sold in the form of street vendors at the county fair; while in urban areas, it will be sold in the supermarkets, open fairs, specialty stores, hotels and guesthouses *etc.*

3.2 Current situation of pork supply chain in China taking Poyang Lake Eco-economic Zone for example In the Poyang Lake Eco-economic Zone in Jiangxi Province, the perennial number of live pigs raised reaches around 15 000 000. With the combination of three-dimensional circulating breeding and healthy breeding, a green supply chain model of live pigs has formed (Fig. 1).

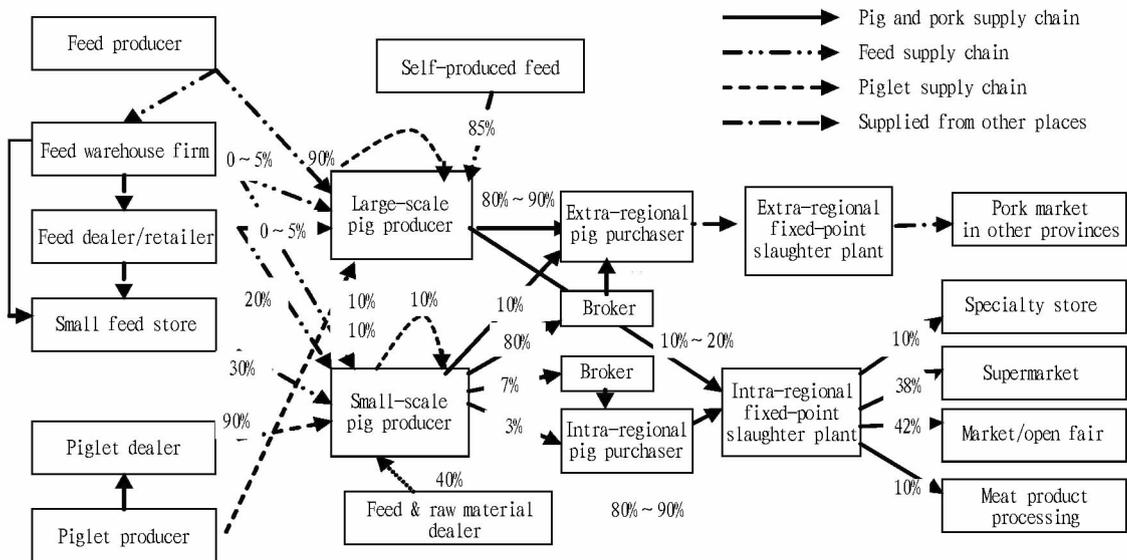


Fig. 1 Pork supply chain in Poyang Lake Eco-economic Zone of China

From the above figure it can be seen that the pork supply chain in Poyang Lake Eco-economic Zone has formed a fairly complete system. In regard to feed supply, pig producers generally fall into two categories, large-scale pig producers (farms) and small-

scale pig producers (scattering households). A major part of the feed used by large-scale pig producers is produced by themselves, accounting for 85% of the feed demand. The amount supplied by feed producers accounts for about 10%, and the amount provided

by feed warehouse firms, dealers or retailers accounts for about 5% in total. For small-scale pig producers (scattering households), the feed has two primary sources. One is buying feedstuff to produce mixed feed, which accounts for about 40% of the feed demand; the other is buying from small feed stores, which accounts for about 30%. Thus it can be seen that the feed of large-scale pig producers (farms) is mainly produced by themselves, while the feed of small-scale pig producers (scattering households) mainly bought from small feed markets or mixed by themselves.

In the respect of piglet supply, the piglets of large-scale pig producers are mainly bred by themselves in the proportion of 90% in the demand for piglets, and the remaining 10% come from piglet producers. By contrast, a major part of the piglets of small-scale pig producers are from piglet dealers, accounting for 90% of the demand for piglets. And the remaining 10% are bred by the producers themselves.

Upon completion of pig growing period, there will be the pig circulation link which mainly involves 4 interested parties: large-scale pig producers, small-scale pig producers, brokers and pig purchasers. There is certain historical background behind the existence of pig brokers. As there are many scattering raising – households with large regional spans in rural China, pig purchasers will have to bear high information cost, search cost, negotiation cost and decision-making cost *etc.* to make contact with the scattering raising – households directly. Besides, due to a lack of market information, the scattering raising – households cannot establish a long-standing relationship with pig purchasers in a timely and effective way. At this point, farmers who master the live pig resources in the local area and have a connection with pig purchasers will act as the pig brokers. The brokers are generally the feed or veterinary drug distributors in the local area. They serve to build a bridge for communication between scattering raising – households and pig purchasers. 80% – 90% of the pigs produced by large-scale pig producers are supplied to the pig purchasers in the other places, and 10% – 20% of them are sent to the designated slaughter plants in this area. For small-scale pig producers, 90% of the pigs produced are distributed to the other provinces, and only 10% of them are sold within the province. Generally, there are 4 kinds of pig circulation; 3% of the pigs are directly supplied to pig purchasers in the local area; 7% of them are sold to pig purchasers in the local area through pig brokers; 10% of them are directly supplied to pig purchasers in other places; 80% of them are sold to pig purchasers in other places through pig brokers.

With respect to pig slaughtering, fixed-point pig slaughtering has been promoted from 1987 in China. In December 1997, the *Regulations for the Administration of Pig Slaughtering* was issued. Fixed-point slaughtering helps to save the transaction costs and ensure pork safety to some extent. In Poyang Lake Eco-economic Zone, the pigs in the fixed-point slaughter plants come mainly from 10% – 20% of the pigs produced by large-scale pig produc-

ers and 80% – 90% of the pigs bought by pig purchasers in the local area.

In the stage of pork circulation, the pork from slaughter houses is mainly delivered to 4 places: 10% flows to specialty stores; 38% to be sold in supermarkets; 42% to be sold at village fairs or open fairs in urban area; and the remaining 10% will be sent to meat processing plants directly.

4 Analysis of pork supply chain in Vietnam

Vietnam has the largest percapita consumption of pork in the Southeast Asia region. In 2010, the percapita consumption of meat in Vietnam was 36.5kg, which was above the average of 31.3kg in Asia. Pork accounts for 77.5% in meat consumption, while poultry and beef only account for 15.7% and 6.6% respectively. Local pork production can basically achieve self-sufficiency with very small import volume. At the same time, Vietnam has been actively committed to improving the pig production capacity so as to increase the export volume of pork. It has become the pork supplier for Russia, Hongkong and Korea gradually while satisfying the domestic consumption needs. The pork supply chain in Vietnam can be divided into two categories, one is the pork supply chain in low-altitude areas, and the other is the pork supply chain in high-altitude areas. Taking the pork supply chain in low-altitude areas of Vietnam (Fig. 2) for example, the paper conducts a comparative analysis with the pork supply chain in China.

As shown in Fig. 2, in the low-altitude areas of Vietnam, the production factors (feed and piglet) provided by the upstream suppliers of large-scale pig producers account for a large proportion of the total demand. All the feed is purchased from feed suppliers, warehouse firms, distributors and retailers. 60% of the piglets are purchased from piglet producers. By contrast, a major part of the feed and piglets of the small-scale pig producers are produced by themselves. In this regard, 49% of the feed and 90% of the piglets are provided by themselves.

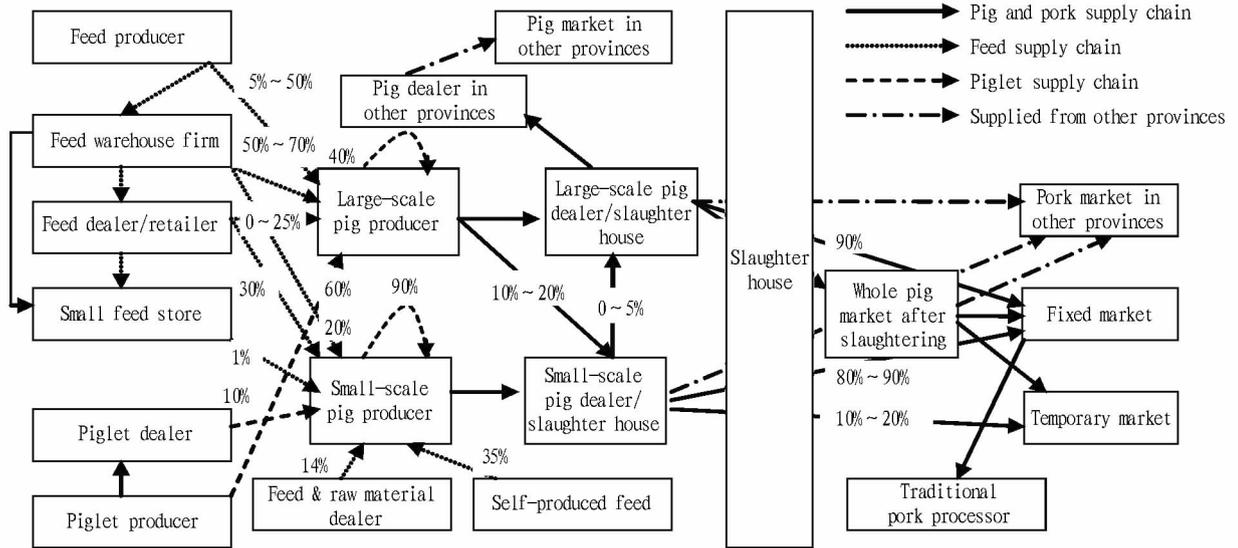
By comparing the pork supply chain of China with that of Vietnam, large-scale pig producers in the upstream of pork supply chain in China have revealed an obvious intention of vertical integration in the industry. But in Vietnam, a certain degree of market division and collaboration have been reflected in this respect. In China, a relatively obvious market division is reflected among small-scale pig producers in the upstream of pork supply chain in China. While in Vietnam, a pattern of self-sufficiency in raw materials to some extent and sales of finished goods has been formed in this respect. Besides, there are no pig brokers in the pork supply chain of Vietnam, thus causing a reduction of intermediate links.

5 Conclusions and Suggestions

This paper analyzes the model and current situation of the pork supply chain and value chain in China applying the method that combines theory with demonstration. Through the comparison with the pork supply chain and value chain of Vietnam, the characteris-

tics, rationality and scientificity of the pork supply chain and value chain in China have been summarized. Research shows that: (i) Pig producers in the upstream of the pork supply chain in China are characterized by two features. One is that large-scale pig producers have shown an obvious intention of vertical integration in the industry or adjacent industries and have put it into practice, which goes against market division and collaboration and hinders the improvement in market efficiency and service level. The other

is that small-scale pig producers face the problem of numerous scattering raising – households with large geographical span, which is not convenient for management and the assurance of food safety. (ii) There are more intermediate links in the pork supply chain in China, which is to the disadvantage of market circulation and information transfer and will boost the price pressure in the market and increase the difficulty in food safety supervision.



Data source: Lucy Lapar (2008) [8].

Fig. 2 Pork supply chain in low-altitude areas of Vietnam

In view of the problems in the pork supply chain of China, adjustments should be made from the aspects of supply chain process reengineering, food quality supervision and policies & regulations *etc.* :

(i) Reengineering the process of pork supply chain (Fig. 3). Link together the nodes in the traditional pork supply chain that are independent of each other by certain forms, change the structure of supply chain process and strive to develop the mode of "Companies + Bases/Cooperatives/Breeding associations + Peasant households" *etc.* For example, the mode "Companies + Peasant households" of Guangzhou WENS Group, the breeding associations of Paishang Township in Jiangxi Province, and the cooperatives in Dingnan County of Ganzhou City. These modes can help to reduce transaction cost, give full play to the advantages of companies in management and market control as well as the land and labor advantages of peasant households, improve the anti-risk capability of peasant households, get a reasonable return on invested capital, lower the transaction cost of companies, improve pork quality and traceability, and guarantee food safety.

(ii) Improving the supervision system of food safety and enhance law enforcement. Conduct all-around supervision for various links including raw material acquisition, production, circulation, sales and after-sales service by means of dispatching specialized persons to livestock farms *etc.* gradually so as to form a nationwide

three-dimensional supervising network. As fixed-point slaughter plants have specific power and position stipulated by laws and regulations and enjoy corresponding benefits, these slaughter plants should play a key role in the safety supervision of pork products.

(iii) Improving the food safety regulations and industry standards that involve various links of food industry. Increase the illegal cost of enterprises by means of establishing and perfecting the emergency response mechanism of food safety, enterprise credit mechanism and release mechanism of food safety information. Regularize the behaviors of enterprises and individuals by means of legal actions and economic benefits.

(iv) Bringing forth new ideas in the management of pork supply chain and the technical support for food safety. Achieve product information circulation, food traceability and "four flows in one" in the whole pork supply chain through technical means like information technology, electronic commerce and visualization so as to save transaction cost, improve circulation efficiency and guarantee food safety.

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of agricultural industrialization entities, how to strengthen risk-resistance ability of agricultural production entities, and increase credit line of agricultural production entities. Besides, many scholars discuss functions of financial support for agricultural industrialization, but few scholars analyze internal relationship between financial support and agricultural industrialization. It is worth discussing whether agricultural industrialization and financial support have equal interaction relationship. The research of financial support for agricultural industrialization has important theoretical and practical significance. However, at present, there are still some weak points and blank space to be deeply studied.

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