An Overview of China's Pork industry

Fall 2006

An Overview of China's Pork industry

Coen Poon

Embassy of the Kingdom of the Netherlands
Department of Agriculture, Nature and Food Quality

4, Liangmahe Nanlu Road
Beijing 100600, P.R. China

www.nlpekagr.com

Foreword

This report on the Chinese pork industry has been written as part of my traineeship for the Agriculture, Nature & Food Quality department of the Embassy of the Kingdom of the Netherlands in Beijing. For my research, I have been given the opportunity to visit local companies and attend various industry-related seminars & exhibitions, so to get a better understanding of the industry. In my opinion, the fieldtrips and interviews showed much added value for they provided me with insights that cannot be acquired from merely desk research. Hereby, I would like to thank my supervisors Ir. Van Duijn and Ir. Nuytens for their constructive feedback and support. In conclusion, this traineeship has been a good overall learning process and I enjoyed being part of the LNV team in China.

TABLE OF CONTENT

Chapter 1

Brief Introduction to China 11

Chapter 2

China's pork industry 13

Chapter 3

Pig Slaughtering/Processing 16

Chapter 4

Meat Retail Channels 19

Chapter 5

Trade Relations 25

Chapter 6

Food Safety 27

Chapter 7

Opportunities & Trends 28

References 30

Official Statistics

A short word of notice on the official statistics with regard to the meat production and consumption used within this report. Most of the data used has been derived, directly and indirectly, from China's National Bureau of Statistics, Euromonitor International, and the United States Department of Foreign Agricultural Service. Upon researching the data, it became clear that there are some disparities between the statistics produced by the various sources. These discrepancies can be explained from the fact that different methods of data gathering are employed, which therefore lead to other results. Nevertheless, despite these disparities, the statistics do provide for a general 'picture' of the current situation, and the way certain trends are evolving in the Chinese meat industry. It must be noted that the provided numbers and percentages found in this report are estimates and should therefore not be used as a sole source of information for decision making.

Abstract

Since the liberalization of its livestock industry in 1985, China's meat production levels have gone up tremendously, thereby positioning the country as world's leading country in meat production. At present, China is ranked number one in the production of pork, lamb and eggs, and holds second and third place in respectively the output of poultry meat and beef. The meat industry plays an important role in China's rapidly developing economy, but it is still considered relatively under-developed, with its main focus on quantity rather than quality. The Chinese government recognizes current issues in the domestic meat industry, and aims to improve present situation in livestock production, slaughtering and processing through regulation. On retail level, the number of supermarkets/hypermarkets is growing, which presents more opportunities for chilled and frozen food products.

While the country's overall meat consumption ranks among the highest in the world, per capita consumption remains relatively low. Rising income levels, changing lifestyles and more concern for food safety, have caused for a shift in the traditional meat consumption pattern.

This market report aims to give Dutch enterprises an overview of the Chinese pork supply chain, from production level to end-consumer. For this purpose, current developments and forthcoming trends in the country's meat industry will be included, as well as the country's entry to the WTO and its implications.

Chapter 1 Brief Introduction to China

The People's Republic of China was founded on October 1, 1949. With a population that exceeds 1.3 billion, it is the most populous country in the world. China is situated in eastern Asia on the western shore of the Pacific Ocean, with an area of 9.6 million square kilometers. Despite its huge size, merely 13.2% is suited for farmland. Its continental coastline extends for about 18.000 kilometers, and along its sea surface there are over 5.000 islands. The country is divided into 23 provinces, five autonomous regions, 4 municipalities (city provinces), and two special administrative regions.

General Overview

In 1978, the Chinese economy gradually transformed from a centrally planned economy to a more market-oriented economy. Reforms began with the slowly phasing out of collectivized agriculture, and slowly expanded to a liberalization of prices, fiscal decentralization, increased autonomy for state enterprises, the foundation of a diversified banking system, the development of stock markets, the rapid growth of the non-state sector, and the opening to foreign trade and investment. The restructuring of the economy and resulting efficiency gains have contributed to a more than tenfold increase in GDP since 1978. Economic development has been more concentrated around coastal provinces which explains the large disparities in per capita between rural and urban regions. Millions of surplus rural workers move between villages and cities, taking on part-time, low-paying jobs for a living. The country's "one-child" policy has lead to one of the most rapidly aging countries in the world. At the moment, the central government focuses on the development of the animal husbandry sector for it is seen an important part of the country's agriculture modernization and new countryside construction. However, this transition is restrained by a number of factors which include (a) backward production; (b) high risks in animal and poultry quality, safety and hygiene; (c) environmental damage due to the country's rapid transformation; (d) inadequate utilization of feed resources and the shortage of protein feed; and (e) the situation concerning animal disease control (MOA, 2006).

Political Developments

While the Chinese government has been focusing on market-oriented developments, its national economy is still officially directed according to Five-Year Plans which lay out growth goals in various industries for the next half decade. These Guidelines are put together by a group of experts from various fields to ensure it covers every aspect in relation to China's economic and social development.

In October 2005, the Central Committee of the Chinese Communist Party approved the draft version of the 11th Five-Year Plan. This year sees the implementation of these Guidelines for the period 2006 to 2010, in which the central government intends to lay a solid foundation for building a new socialist countryside. Its aim is to boost modern agriculture; develop new relationships between industry and agriculture, cities and the countryside; and increase rural affluence (Naughton, 2006). The Ministry of Agriculture (MOA) has set a number of quantitative targets for animal husbandry. By 2010, meat, egg and milk production are forecasted to reach 86 million ton, 30 million ton and 42 million ton respectively. The output value of animal husbandry should reach 38% of the country's total agricultural value. In addition, the percentage of standardized livestock and moderate scale size poultry production are expected to increase by 10%. Also, the overgrazing on natural pastoral land will be reduced to 25%, and more than 150 million ha desertified, eroded and polluted pastoral land will be rehabilitated (MOA, 2006; USDA FAS, 2006).

Main tasks of the 11th Five-Year Plan include:

- Speeding up the development of animal husbandry and ensuring the supply of animal products;
- Increased monitoring and supervision on product quality and continuing product safety improvement;
- Improving the industry's profit in order to raise farmers' income;
- Heighten awareness on environment protection and eco-construction.

Source: MOA (2006)

Creating a New Socialist Countryside

The construction of a new socialist countryside is a major objective in the 11th Five-Year Plan. It is believed that the country can only ensure sustainable development of its

Table 1: Comparison China and Netherlands

Year 2005	People's Republic of China	The Netherlands
Area	9.596.960 km²	41.000 km²
Population	1.307 million	16 million
Number of households	539.1 million	7 million
Gross Domestic Product (USD)	2.224.9 billion	635 billion
GDP per capita	1.400	30.862
Import (bilateral)	2556.5 (€) million	19056.4 (€) million
Export (bilateral)	19056.4 (€) million	2556.5 (€) million
Currency	Renminbi	Euro

Source: EVD, CBS and China Statistical Yearbook (2006)

national economy and continuous expansion of domestic demand, by developing its rural economy and helping farmers to become more affluent. Raising rural household incomes is of great importance as the urban-rural gap has widened greatly since 1985, which has become a large source of societal inequality.

The Chinese government aims to modernize its agriculture by establishing major farming and processing plants, and adjusting geographical distribution. Measures to reach this objective include: increased rural investment, agricultural subsidies and improved social services. This new policy is a significant change from the previous focus on economic development since more attention will be given to the redistribution of resources and a rebalance of income.

The central government has further pledged sustained increases in farmers' incomes, more industrial support for agriculture and faster development of public services. This year sees the end of agricultural tax, and raised farm subsidies. The government will also increase rural health subsidies to revitalize the cooperative health system. These measures promise greater protection and more stability in rural areas. More efforts will be invested in the development of public rural services and agricultural infrastructure (www.anhuinews.com 2006; Naughton, 2006).

Animal Husbandry Law

The Chinese government has enacted several laws to promote its country's agriculture, which means more investment in rural infrastructure and agricultural technology. In this line, the Animal Husbandry Law was put into force on July 1, 2006. This eight-chapter Law includes regulations on livestock breeding, raising and production, transportation and product quality protection. To ensure the quality and security of livestock products, animal feed, additives and medicines should meet legal and technical standards set out by the Animal Husbandry Law. The newly implemented law aims to facilitate the modernization of China's animal husbandry industry by encouraging the development of large-scale and highly productive livestock farms. At this moment, China sees a lot of small-size household farmers whom raise their livestock in their backyards.

The Animal Husbandry Law aims to improve meat safety whilst protecting farmers' livelihoods. Government authorities should offer financial and technical support to farmers to expand and improve production, whilst farmers should register their farms and establish breeding records, which will also log the use of veterinary feed and medicine. Farmers would be required to report outbreaks to local animal epidemic prevention agencies and take measures to curb infections, and if diseased stocks are removed because of sickness, they would be entitled to claim compensation (China Daily, 2005).

- Great Hall of the People -

Chapter 2 China's pork industry

China's pork industry has grown rapidly since the government decided to remove state procurement quotas and price controls in 1985. China has become world's largest pork producer in the world, slaughtering 660.98 million hogs in 2005, up from 198 million heads in 1980. In 2005, total output of meat was 77.4 million tons; pork output had a share of 64.7% with 50.1 million tons (China Statistical Yearbook, 2006). Liberalization of the pig market has resulted in more volatile market movements in both output and price. The figure below depicts China's pork supply chain from breeders to various retail channels.

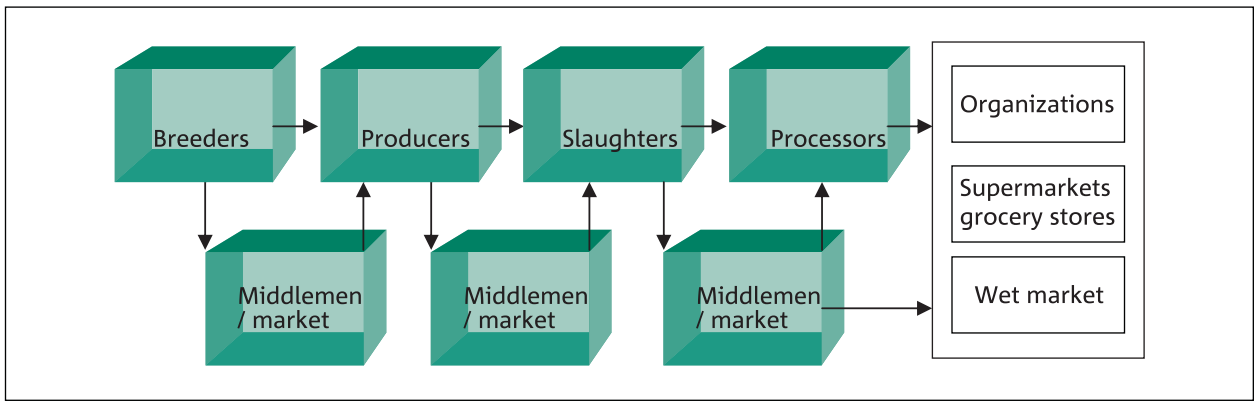
Hog production

In 2004, average prices for piglets, live pigs and pork were respectively 12,8 RMB, 8,58 RMB and 13,76 RMB per kilogram. Pig grain ratio was 6.32:1 in 2004. Farmers could get a gross profit of 200 - 250 RMB for a pig reaching slaughter weight, and pig-raising enterprises operating on a large commercial scale could earn more than 100 RMB for a commercial pig (China Agricultural Development Report, 2005).
Hog production can be divided into three specific categories: backyard farms, specialized households, and commercial farms. At present, about 80% of China's pork output comes from small individual backyard farms, whereas 15% comes from specialized households and merely 5% from large commercial farms (USDA FAS Gain report, 2006; Zhou, 2006).

Small backyard farms

Most backyard farms keep 1 to 5 hogs as these small households have a size of only 0.6 hectares of land or less. Labor costs are zero to none due to high under employment in these rural areas. Investment in animal housing is kept low since a pigsty is semi-open with mud walls. Pig feed comes mostly from vegetables, table scraps, green fodder and unprocessed grains and oilseeds. Manufactured compound feed or concentrate feed is used as a supplement. Feed costs accounts for 70% of total production costs. According to Pan and Kinsey (2002), small family household producers can mainly be found in middle and western areas, whereas pig production in the more developed areas along the coast, is much more concentrated and specialized.

Figure A: China's pork supply chain



Source: Pan and Kinsey (2002)

Figure B: Hog producers

Source: Zhou (2006)

Table 2: National swine size of farm and slaughtered pig for 2003

Slaughtered pigs	# of farms	(%) Share	Total slaughtered (x1,000)	(%) Share
1 - 9	101.963.901	94.483	347.731	52.867
10 - 49	4.815.474	4.462	120.945	18.388
50 - 99	851.429	0.789	58.999	8.970
100 - 499	249.016	0.231	59.639	9.067
500 - 2999	33.844	0.031	36.477	5.546
3000 - 9999	3.388	0.003139	17.420	2.648
10000 - 49999	911	0.000844	14.181	2.156
50000 and above	30	0.000028	2.358	0.359
	107.917.993	100	657.750	100

Source: USDA FAS GAIN Report Livestock and Products Semi-Annual (2005)

Medium-sized specialized households & large commercial farms

Several studies show that although small-sized pig farms still account for a major share of pig production, backyard production has been decreasing, while medium-and large scale production have been slowly expanding. Specialized households and commercial farms use more advanced management practices, better swine breeds and animal feed. Whereas hogs raised by backyard farms tend to have higher fat ratios, commercial farms main product is lean meat (Pan and Kinsey, 2002).

It is expected that more specialized farming and large scale production will be seen in the future. The shift towards larger scale production can be explained by the fact that there is government support which is aimed at improving meat quality. Several programs were launched to promote the lean meat yield, and local government authorities established medium- and large-sized farms around big cities to guarantee the meat supply in urban areas. In addition, today's urban consumer prefers lean pork which also supports the movement towards more large scale farming as production of lean pork requires certain investments that small backyard farmers cannot easily afford (Pan, 2000). However, it is believed that backyard hog production will not phase out into large-scale production in the foreseeable future, taking into regard China's large population and land scarcity.

Key Producing Regions

In 2005, total output of pork in the world was 94.2 million tons, whereas China's output was 50.1 million tons (China Statistical Yearbook, 2006; USDA FAS, 2006). The Yangzi River and Northern China regions are the key pork producing and internal exporting zones in China. Northeastern China used to be short of pork due to the colder climate, but this region is becoming self-sufficient and is starting to export to other regions due to cheaper feed ingredient supply and high cost of grain transportation in the last several years (China Agricultural Yearbook 2006; Wang 2006).

- The Yangzi River region has a 34.9% of national pork output. This region includes: Sichuan, Chongqing, Guizhou, Hunan, Jiangxi, Zhejiang and Anhui provinces.
- The Northeastern region has an 8.0% of national pork output. This region includes: Liaoning, Jilin and Heilongjiang provinces.
- The Southeastern region has a 13.4% of national pork output. This region includes: Fujian, Guangdong, Yunnan and Hainan.
- The Northern China region has a 22.9% of national pork output. This region includes: Hebei, Shandong, and Henan provinces.

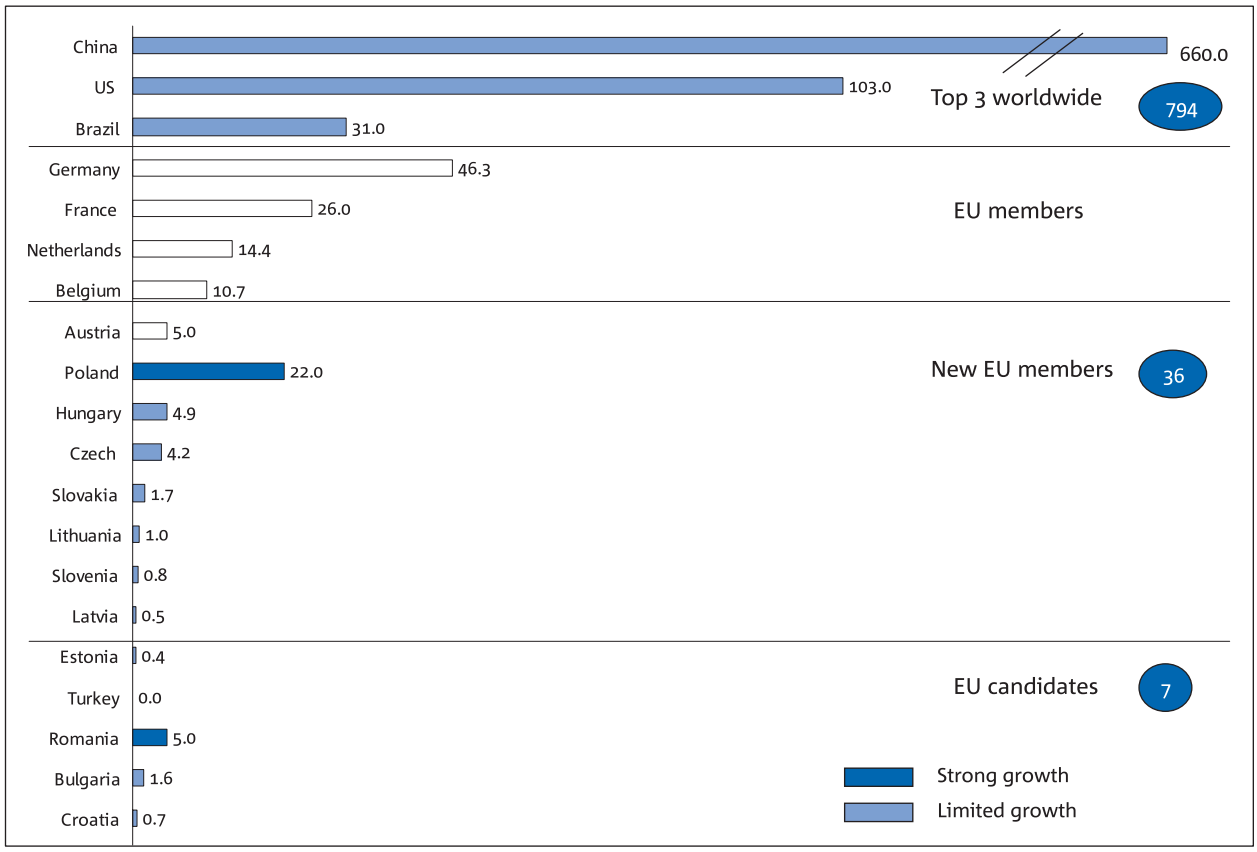
Table 3: Top 10 pork producing provinces in 2005

Region	Output of pork (in 10.000 tons)
Sichuan	513,7
Henan	440,8
Hunan	437,0
Shandong	367,1
Hebei	337,4
Hubei	256,3
Guangdong	256,3
Yunnan	244,2
Jiangsu	218,5
Anhui	215,6

Source: China Statistical Yearbook (2006)

- Map of China -

Figure C: Comparison of hog slaughter by country in 2005 **(mln heads)**



Chapter 3 Pig Slaughtering/Processing

Pig slaughtering has become a major problem for the Chinese government since it started to liberalize the livestock market in 1985. The slaughtering market used to be run by state controlled slaughtering houses, but at present individual butchers dominate the slaughtering sector with a share of more than 80%. Though liberalization has helped promote pig production, it also caused for a significant amount of contaminated meat through illegal slaughtering. The government issued the Hog Slaughtering Act on January 1, 1998, which demanded that all hogs were to be slaughtered at designated slaughtering plants. Despite this Act, it remains difficult for the government to control all backyard farmers, which means it is hard to eliminate illegal slaughtering (Pan and Kinsey, 2002).

Designated state slaughtering houses show a serious overcapacity in machine slaughtering and cold storage since these large-scale slaughtering plants cannot compete with the low costs of individual butchers. The size of these abattoirs varies from small with a capacity of 10,000 hogs per year, to large abattoirs with a capacity of 100,000 hogs per year. A report by Pan and Kinsey (2002) further shows that overall utilization of slaughtering capacity can be as low as 15% due to the dominance of individual butchers.

The meat-processing sector has improved significantly with the introduction of foreign equipment and processing technology. Traditional processing lines have gradually been replaced with modern machinery, and along the way traditionally flavored meats were substituted by more Western-flavored meat products, especially in the large cities. For example, Henan Shuanghui Group uses advanced equipment for its meat processing factories which includes MPS equipment from the Netherlands.

Domestic producers

According to the government, the Chinese meat sector saw 312 new companies established during 2005, which brought the total number of Chinese meat processors to more than 2500. Domestic producers are still the main players in Chinese pork processing sector. Leading companies such as Shineway had a turnover of $ 2 billion in 2005 and Yurun $ 1 billion. Though these large commercial producers sell some of their production through wet markets, they mostly cater to supermarkets, hotels, restaurants, and other institutional buyers (Fabiosa et al, 2005).

- Advanced Meat Processing System -

Some international players have already started production in China, but thus far their market shares are not significant. Hormel Foods, for example, had a retail market share of 0.6% in 2005 (Euromonitor International, 2006). This can be explained by the fact that local competitors adopted a cost driven strategy which proved to be more successful in a mass market.

Table 4: Top meat companies in China's pork industry in 2004

Top pork processing companies	Turnover (million RMB)
Henan Shineway Group (Shuanghui)	16020
People's Food Holding Ltd	10047
China Yurun Food Industry Group Co Ltd	7921
Henan Zhiyuan (Sunway Food)	4860
Delisi Group	3625
Chengdu Hope Food	1823
Henan Zhongpin	1784
Sichuan Gaojin	1710
Beijing Shunxin	1583

Source: China Meat Association (2005); Rabobank (2006).

During the World Meat Congress 2006, Dr Zhou Guangzhong, professor and vice president of Nanjing Agricultural University and chairman of the Chinese Society of Animal Products Processing, told his audience that he expects large and medium meat processors will have a 70% of the market by 2020 supplying mainly large supermarkets (www.meatprocess.com, 2006).

Distribution, logistics and transportation

China's rapid economic growth has placed increased pressure on the country's logistics and distribution structures. While the Chinese government has made efforts to upgrade its existing transportation infrastructure over the past decade, its logistics and distributions sector remains fragmented. According to Wu (2003), the country's logistics system is underdeveloped due to three main reasons. First of all, the Chinese landscape is characterized by large mountain areas, altitude differences, desert sand, and some regions suffer from seasonal flooding. Next, China's transportation networks are heavily fragmented due to regulatory barriers that hinder consolidation. Local governments are known to protect its local transportation companies by raising barriers which includes license requirements, fees, and inspections. Few licenses have been granted for nationwide operations, while

companies that have been given this privilege still run into protectionist measures set up by local government authorities. Lastly, the country's logistics capabilities are greatly restricted due to inferior equipment which is geared towards the movement of bulk commodities, and workers whom are often not well trained in handling goods.

Pan and Kinsey (2002) mentioned two main distribution channels through which pigs are delivered to slaughtering houses. Firstly, backyard farmers can sell their pigs straight to slaughtering houses, or they are gathered in villages at certain procuring spots directed by large slaughter houses. Specialized households deliver to commercial farms, since there is usually a contract between these two parties. In most commercial farms, the slaughtering process is part of the integrated production chain. To ensure product quality, most of these commercial farms are integrated, from feed supply, sow-piglet production, pig finishing, slaughter processing, and distribution (Fabiosa et al, 2005). Leading meat companies like Shineway and Yurun, have their own transport and storage facilities.

Whereas shipment by rail would be a good option for moving non-perishable goods, transport of meat products and frozen foods by train is less suitable as it is too slow and unpredictable. For chilled processed meat, there are strict cold chain conditions in place which these products must adhere to; also there is a 300k maximum travel distance from production plant (Euromonitor International, 2006). Smaller manufacturers tend to focus on a regional market due to the inefficiency of transportation. Companies without their own distribution network, find their choice of distributors is limited, as the wholesale and import-export sector is still heavily controlled by the Chinese government, which makes price negotiations difficult. Backyard farmers rely more on wholesalers, since these companies buy their pork, while there are farmers whom handle the slaughtering process themselves, and then deliver the meat to consumers (Pan and Kinsey, 2002).

"Dragon head"-concept

Pan and Kinsey (2002) already pointed out that both vertical integration and contracting were expected to be seen more in the years ahead, in particular contracting since backyard production will continue to exist. A system of contractual relationships ensures a supply of high quality hogs to processing plants, decreases the volatility in raw material cost, and rewards the risks shared by processors and producers over the long term. Through contracts, processors are able to obtain larger outputs while economizing on capital and labor, and producers can reduce risks and obtain financial support. Sanitary standards can also be improved, since the delivery of quality products is important for processors to establish and sustain market image.

A system of contracting already exists since the mid 1990s, when Chinese agriculture officials started to promote the idea of "dragon head" companies. This "dragon head" concept emphasizes links between farmers and processing- and marketing companies to strengthen farmers' relationships with the market and to raise farm incomes. Leading companies are selected or established by local government authorities to contract with hundreds of individual farmers in their region, and procure, process, and market agricultural products from farmers. Under the contract, farmers provide labor and land, while the dragon head company provides seed, operating loans, fertilizer, and technical expertise. Within this system, farmers have less control over the marketing process, but they are also less vulnerable to market risk as compared to conducting business through traditional open markets.

Though the "dragon head"-concept resembles contract production as seen in U.S. agriculture, it must be said that government authorities play an active role within the Chinese system. The ownership structure of these dragon head companies is unclear, but most of them seem to be spin-offs of local grain bureaus and other government marketing entities. Whereas some are privately owned, others are joint ventures with foreign companies. The government's role may include ownership, direction, or provision of land, facilities, credit, or subsidies. Management decisions seem to reflect government plans to develop particular sectors, sometimes resulting in overcapacity. Thus, while China's food sector appears to be privatized, the government still has much influence (http://www.ers.usda.gov/, 2006).

- Pig transport to market -

Contact details of leading companies

(Alphabetically listed)

Company : **Delisi Group**
Address : Zhucheng Shandong 262216
Telephone : +86-536-6339999
Fax : +86-536-6401233
Website : http://www.delisigroup.com/qyjj.htm

Main business: Live pig raising, slaughtering & processing, low-temperature meat products.

Company : **Gaojin (Sichuan)**
Address : Chuangxin Industry, Suining District, Sichuan Province, China
Telephone : +86-825-2659099
Fax : +86-825-2659019
Website : www.gaojin.com.cn

Main business: Slaughtering & processing of live pigs, canned food.

Company : **New Hope Group - Chengdu Hope Food Co Ltd**
Address : Xiwang dadao zhongduan, Xinjin County, Chengdu City, Sichuan, Province 611430
Telephone : +86-28-82550318
Fax : +86-28-82552688
Website : http://www.xiwangfood.com

Main business: Feedstuff processing, slaughtering & processing, meat products.

Company : **People's Food**
Address : Bancheng Town, Lanshan District, Linyi City, Shandong Province 276036
Telephone : +86-539-8692888
Fax : +86-539-8692321
Website : http://www.jinluo.com.cn

Main business: Stock raising, slaughtering & processing, meat products, additives.

Company : **Shuanghui Group (Shineway)**
Address : 3/F, Shuanghui Building 1 Shuanghui Road, Luohe, 462000
Telephone : +86-395-2676158
Fax : +86-395-2693259
Website : http://www.shuanghui.com.cn

Main business: Cultivation, slaughtering & processing, meat products, condiment.

Company : **Shunxin Agriculture Co Ltd (Beijing) - Pengcheng Food subsidiary**
Address : 42 Shunsha Rd South, Nanfaxin area, Shunyi District, Beijing 101301
Telephone : +86-10-69472617
Fax : +86-10-69471791
Website : www.sxpengcheng.com

Main business: Stock raising, live pig slaughtering, processing of meat products.

Company : **Yurun Food Group**
Address : No. 17 Yurun Road, Jianye District, Nanjing City
Telephone : +86-258680-2757
Fax : +86-25551-0132
Website : http://www.yurun.com

Main business: Slaughtering & processing, meat products, quick-frozen food.

Company : **Zhiyuan (Henan)**
Address : Sunwayfood Industrial Park, Luyi County, Henan Province
Telephone : +86-394-7186306
Fax : +86-394-7219877
Website : www.sunwayfood.com

Main business: Stock raising, slaughtering & processing, cold storage.

Company : **Zhongpin (Henan)**
Address : 21 Changshe Rd, Changge district, Henan Province
Telephone : +86-374-622316
Fax : +86-374-6227818
Website : www.zhongpin.com

Main business: Poultry processing, canned meat, quick frozen food.

Chapter 4 Meat Retail Channels

The transformation of China's food retail sector is continuing at a rapid pace. The pace of change varies widely, with Shanghai, Beijing and Guangzhou leading the way. There are several retail channels in the pork supply chain through which meat products are delivered to consumers. Dr Zhou (2006) has categorized three types of retail outlets: wet markets, traditional markets, and supermarkets/hypermarkets.

Wet Markets

A wet market can be defined as a place where local farmers supply live poultry or freshly slaughtered meat products direct from the field to the end consumer. These outlets remain the most preferred avenue outlets to purchase fresh meat. Though wet markets are on the decline in China's retail market, these retail channels continue to dominate smaller cities, and remain a presence even in the largest cities. Nevertheless, wet markets are unlikely to disappear entirely, as these small outlets remain the preferred venue for low-cost fresh vegetables and meat. Freshness and price are the main concerns for Chinese consumers (Bean, 2003).

Today, many wet markets in big cities are being closed or consolidated since local authorities in most cities view the wet markets as unsanitary. SARS has been named as an important factor which accelerated this process since these places are the primary source for sales of exotic meats, which were blamed for the SARS outbreak. In addition, tax revenues from wet markets are small compared to other better-regulated markets. In some areas, local authorities have decided to move these markets into supermarket-style venues where multiple vendors can operate in a cleaner and better regulated environment (Bean, 2003).

Traditional markets

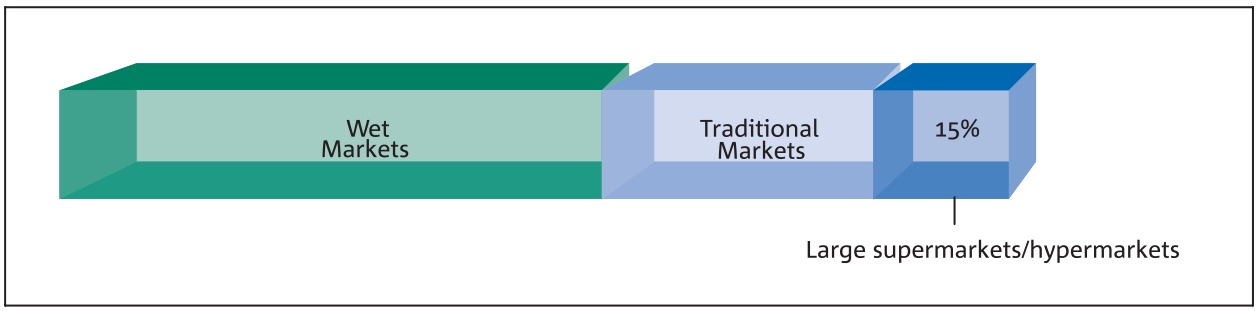
Traditional markets can be found in rural areas and small townships, out of reach of supermarkets and chain stores. Whereas afore mentioned wet markets offer fresh meat and half processed meat products, vendors from traditional markets only sell fresh meat products.

Large Supermarkets/Hypermarkets

Studies have shown that supermarkets, hypermarkets, and convenience stores are spreading rapidly beyond the top 60 cities of China. Besides the major coastal cities, supermarkets are now gaining increasing foothold in the top, second tier, and third tier cities all around China (Reardon et al, 2003; Bean, 2003).

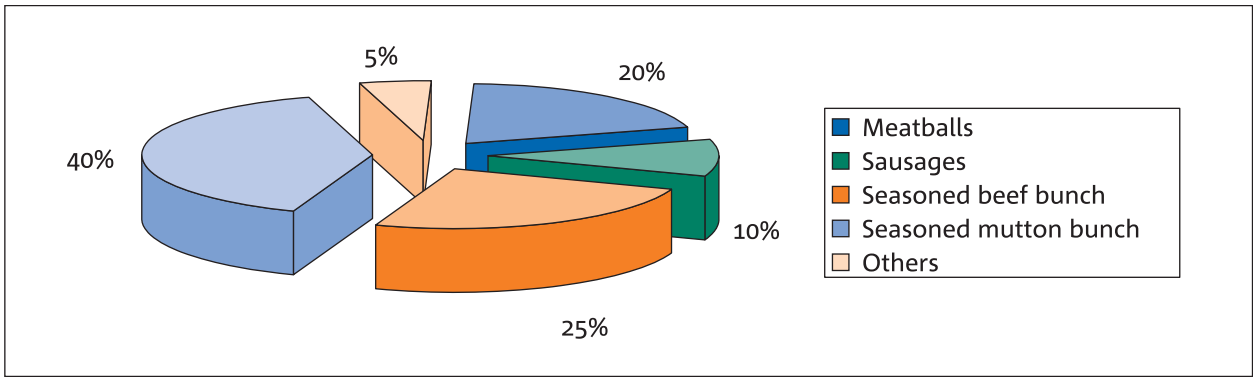
More and more consumers tend to favor a visit to the supermarket since these retail outlets offer a cleaner, more comfortable and convenient shopping environment. Quality is generally better and more standardized. In the case of packaged foods, shoppers do not have to haggle over prices, and they can trust product measures and units. In addition, supermarkets have a wider array of products. While supermarkets demonstrate a clear price advantage for a broad line of products, the prices of fresh products tend to be higher. Furthermore, many Chinese supermarkets

Figure D: Retail outlets



Source: Zhou (2006)

Figure E: Frozen processed red meat products



Source: Euromonitor International (2006)

have been handicapped by a poorly managed fresh products sections. Though packaged food might be successful, fresh meat has not been an important proportion of sales for many supermarkets (Pan and Kinsey, 2002).

Research shows that many supermarkets have two to three suppliers of meat products, which are mostly integrated commercial-type producers that can assure both product quality and consistency in supply (Fabiosa et al, 2005).

Foreign-invested hypermarkets include Carrefour, Makro, Metro and Wal-Mart, whereas Chinese counterparts include Hualian, Nonggongshang and Wu Mei. As mentioned above, local government authorities have been aggressive in relocating, merging and shutting down wet markets, which has helped to drive customers toward the fast-growing supermarket and hypermarket sector (Bean, 2003). Dr Zhou (2006) expects large supermarkets to increase their market share from 15% to 40%.

Consumption of Fresh Meat

Roughly, three kinds of raw meat can be found in the market, namely: fresh, frozen and chilled meat. According to China's National Bureau of Statistics, raw and processed-meat production in the country rose at an average annual rate of 5.9% from 1994 to 2004. Total consumption of fresh meat in 2004 was close to 74,000 tons. Pork constituted 66% of total volume sales, followed by poultry (18%), and beef and veal (10%). The remaining part is composed of mutton and other types of meat. Consumption of fresh meat has diminished due to diseases such as mad cow, and SARS (Euromonitor International, 2006). It is expected that growing affluence will lead to higher ownership levels of refrigerators, freezers, and microwaves, which gives raise to a growing demand for frozen and chilled meat products.

Frozen processed meat

Processed products can be defined as cuts of plain meat which are further prepared, often with the addition of other ingredients. Plain meat cuts e.g. beef steak, pork chops and minced meat are thus excluded. Processed red meat products include sausages, meat burgers, minced meat, pork chop with seasoning, beef in curry sauce, etc.

Sales of frozen processed food in China reached RMB 32,738 million and 1,503 million tons, representing a value and volume growth of 6% and 7% respectively in 2005 (Euromonitor International, 2006). Growing affluence among local consumers has made frozen products more affordable, whereas the growing number supermarkets and hypermarkets facilitated the availability of frozen products in second-tier cities.

Chilled processed meats

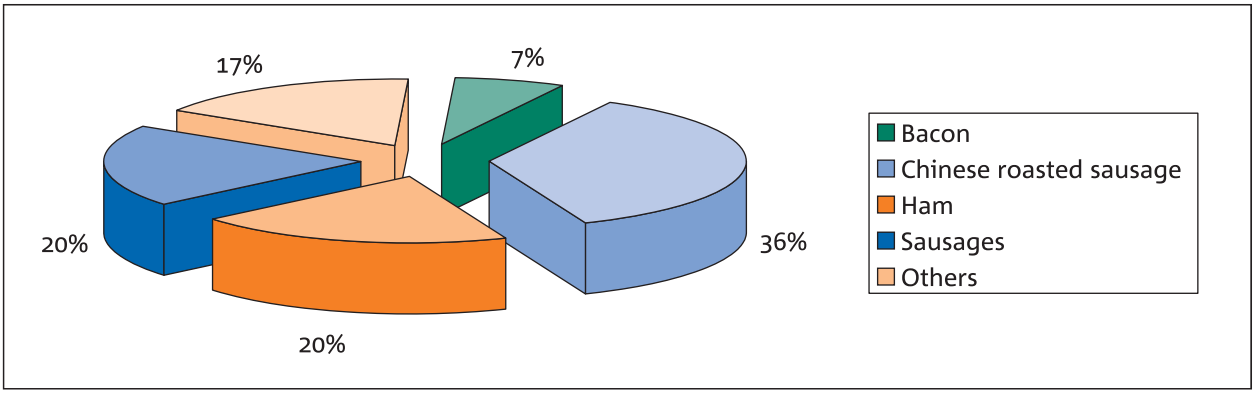
These products include meat or poultry based burgers, nuggets, sausages, ham, salami, chilled snacks, etc. Various products with shelf life of 2-6 months and vegetarian meat products are also included. Sales of packaged raw pieces/cuts of meat and minced meat are excluded.

In 2005, sales of chilled processed food reached RMB 11,849 million and 365 thousand tons. Today's consumers are increasingly more concerned about food safety, and chilled processed food which is regarded as being hygienic and tasty, is gaining more popularity among Chinese affluent consumers. The higher household penetration of refrigerators in urban areas also facilitated a wider acceptance of chilled processed food in major cities. However, penetration as a whole is still considerably low, hampered by its relatively high unit price and lower product awareness in less developed areas. Therefore, chilled processed food only enjoys fast development in major cities. Increased importance of food combined with rising living standards and hectic urban lifestyle, are believed to give rise to the demand for chilled processed food, particularly in developed regions (Euromonitor International, 2006).

Type of Consumers

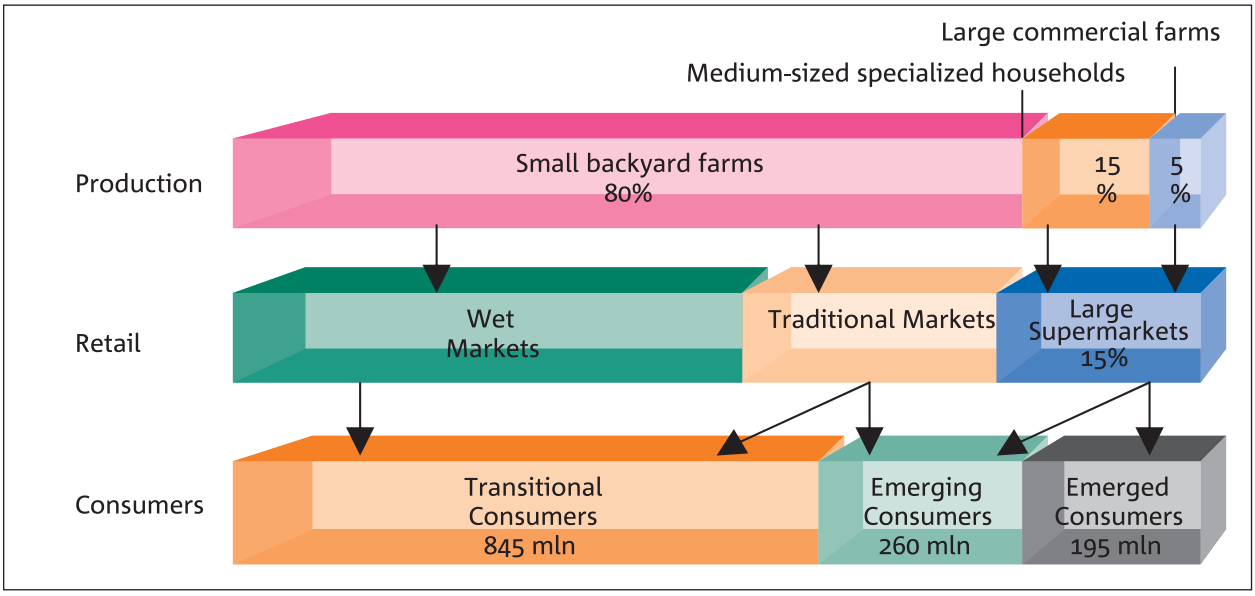
Dr Zhou (2006) identified three basic groups of consumers in China. Firstly, there are *"transitional consumers"* whom number over 800 million. These consumers live in rural areas, and while they constitute around 70% of China's

Figure F: Chilled processed meat products



Source: Euromonitor International (2006)

Figure G: Industry Structure sketch - today



Source: Zhou (2006)

population, they account for just 30% of total meat consumption. This can be explained by the fact that the income level of people living in rural areas is about a third of those in urban areas, and consumption of meat by rural people is half of that by people in urban areas. Transitional consumers get their meat mainly from wet markets. The second group consists of roughly 200 million *"emerging consumers"*, whom buy their meat products in traditional markets but are gradually moving towards the supermarkets. The last group is made up of 195 million *"emerged consumers"*. These upper class and white collar consumers look for brand and premium pork products, and get their meat from supermarket outlets (Pan and Kinsey, 2002). They are less-price sensitive and more health conscious. Dr Zhou expects the last group to have grown considerably by 2020.

Level of Pork Consumption

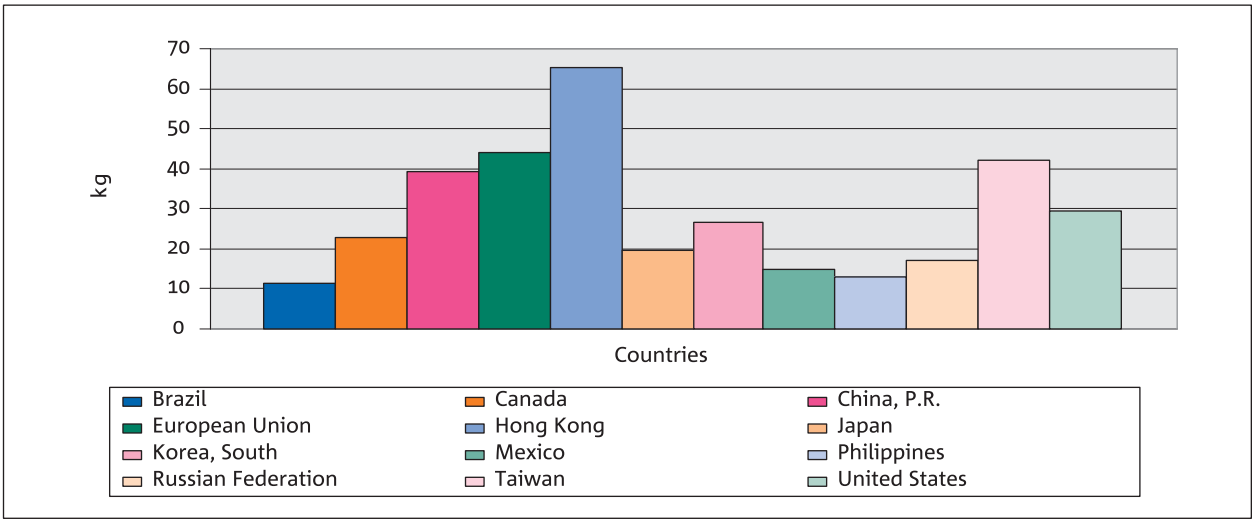
Nowadays, Chinese consumers have a lot more choice with regard to different types of meat, but the dominant meat remains pork. Though market data from USDA FAS shows that per capita pork consumption has been rising each year, it is slowly losing market share to other meats like, beef and poultry, in the meat consumption basket.

Table 5: Consumption of Pork 1,000 Metric Tons **(carcass weight equivalent)**

Year	2001	2002	2003	2004	2005 (p)	2006 (f)
China, People's Republic of	**41,829**	**43,238**	**45,098**	**46,275**	**49,395**	**51,750**
European Union	19,317	19,746	20,043	19,773	19,839	20,085
United States	8,389	8,685	8,816	8,817	8,671	8,826
Japan	2,268	2,377	2,373	2,562	2,512	2,500
Russian Federation	2,076	2,453	2,420	2,337	2,429	2,484
Brazil	1,919	1,975	1,957	1,979	2,039	2,140
Mexico	1,298	1,349	1,423	1,556	1,556	1,585
Korea, South	1,158	1,199	1,294	1,331	1,282	1,297
Philippines	1,085	1,137	1,167	1,170	1,130	1,152
Taiwan	977	967	947	959	959	973
Canada	1,082	1,072	1,004	1,072	978	958
Others	2,332	2,481	2,555	2,548	2,464	2,459
Total	**83,730**	**86,679**	**89,097**	**90,829**	**93,254**	**96,209**

Source: USDA FAS Livestock and Poultry: World Markets and Trade, March 2006.
Notes: EU data includes 25 member states for all years.
(p) preliminary; (f) forecast

Figure H: Comparison per capita consumption of pork in 2005



Source: USDA FAS Livestock and Poultry: World Markets and Trade, March 2006.

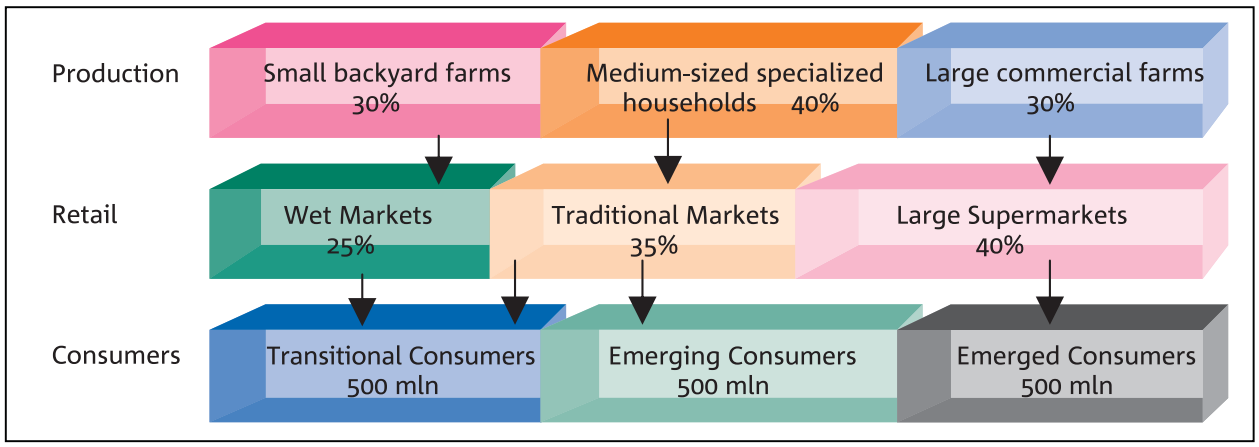
While China holds the number one position when it comes to overall pork consumption, USDA FAS data shows that per capita consumption by Chinese consumers is relatively low. However, this data does not show the large income gap between urban consumers and rural consumers which has led to different consumption patterns. Per capita consumption of meat is higher in urban areas where income levels are higher than rural areas. To illustrate this example, per capita consumption of pork, beef, and mutton in rural areas was estimated at 14.8kg in 2004, whereas urban areas showed a per capita consumption level of 22.9kg (China Agricultural Development Report, 2005).

Importance of Branding

As local consumers become more affluent, leading players in the Chinese meat industry have become more brand-oriented. A brand can be seen as *"a seller's promise to deliver a specific set of features, benefits, and services consistently to the buyers"* (Kotler, 2000). Today, companies like Yurun and Shineway aim to develop a set of positive associations for their brand(s) which should result in higher brand loyalty. They invest in consumer promotions like TV commercials, sample trials in stores and price discounts to stimulate demand (Euromonitor International, 2006). Yurun Food Group, for example, wants its products to be perceived as *"hygienic, fresh, nutritious, convenient, and modern"* (http://www.yurun.com, 2006). Nowadays, local consumers are seen purchasing more branded food products since these products are believed to be safe, or at least less likely to be contaminated with diseases.

Major retailers like Carrefour and Lianhua have launched their own private labels in large cities. While industry players indicate that these private labels currently lack good products, they still poses a certain threat to branded manufacturers as retailers are more active in promoting their own products. In addition, these private labels are often lower priced than other brands since retailers have to spend less in promoting their own products (Euromonitor International, 2006).

Figure I: Forecast industry structure by 2020



Source: Zhou (2006)

Pig by-products

According to Fabiosa et al (2005), the supply of variety meats offers the most promising market opportunity for foreign suppliers in China. Pig by-products are especially popular with Chinese consumers. These products include all the parts of the pig left over after production of fresh and frozen pork, for example: pig innards, pigskin, pig tails, lard and pig heads. Edible by-products like pig stomach and heart are sold to suppliers of fresh markets, whereas non-edible by-products are sold for industrial use.

Table 6: By-products

- Blood: Protein source in animal feed, also for fabric printing & dyeing;
- Brains: Medicine production;
- Skin: Leather for garments and shoes;
- Bones: Calcium-rich animal feed;
- Hair: Artists brushes.

Source: http://www.peoplesfood.com.sg (2006)

Wang (2006) reports that Chinese offal export accounted for only a small percentage, less than 1% of total pork exports. In contrast, offal import was about 50% of total pork import in 1990, but reduced to 25% in 1998. Offal import in the first two months in 2004 and the first quarter of 2005 were 20.100 tons and 31.200 tons respectively; reduced compared to the same period of 2003. Offal was mainly imported by Guangdong, Shanghai, Liaoning, Jiangsu and Henan from USA, Canada and Denmark. Table 8 shows that many offal parts are sold at relatively high to prices in the US. Chinese consumers are willing to pay more for by-products since these products are seen as delicacies, or hold certain health benefits.

Table 7: Comparison of retail prices

Retailer	United States	Beijing
	US$/kg	US $/kg
Muscle meat		
- tenderloin	10.89	1.89
- Shoulder	2.91	1.40
- Ham	3.92	1.57
- Ribs	6.05	2.27
- All pork		1.56
Offal		
- Ears	1.68	2.02
- Hearts	0.44	1.39
- Hocks	0.31	1.57
- Stomach	0.55	1.77
- Tongues	1.19	2.27
- Kidney	0.18	1.89
- Livers	0.20	0.88
- Lungs	0.09	0.97
- Feet	0.32	1.52
All offal		1.05

Source: Fabiosa et al (2005), and price-survey in Beijing (2006)

- Pig feet & livers sold at wet market -

The following tables show Dutch offal exports to China as well as Hong Kong since a certain amount is re-distributed to the mainland.

Table 8: Offal export Netherlands China **weight x1000 kg, value x1000 Euro**

Export Netherlands - China	Weight	Weight	Weight	Value	Value	Value
Year	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**
Bowel, bladder, stomach	4,820	9,156	9,426	8,830	27,800	33,775
Other Beef Offal	0	0	75	0	0	14
Offal Sheep/Goat	562	19	0	190	6	0
Total	**5,382**	**9,175**	**9,501**	**9,020**	**27,806**	**33,789**

Source: PVE (2006)

Table 9: Offal export Netherlands Hong Kong **weight x1000 kg, value x1000 Euro**

Export Netherlands- Hong Kong	Weight	Weight	Weight	Value	Value	Value
Year	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**
Bowel, bladder, stomach	6,868	5,384	6,669	4,696	3,741	5,690
Other Beef Offal	62	120	248	67	118	211
Offal Sheep/Goat	0	601	30	0	186	24
Other Beef Offal Fresh	0	3	2	11	17	21
Beef liver chilled	0	1	2	9	12	17
Beef tongue frozen	0	0	0	0	0	0
Total	**6,930**	**6,109**	**6,951**	**4,783**	**4,074**	**5,963**

Source: PVE (2006)

- Edible offal: popular among Chinese consumers -

Chapter 5 Trade Relations

China's accession to the WTO at the end of 2001 was believed to result in higher pork imports as tariffs on pork would be reduced from 20% to 12%, and foreign firms were allowed to engage in pork distribution in the domestic market. However, thus far China remains a net exporter of pork. In 2004, China's pork imports fell sharply due to increased domestic pork production, stronger import demand for pork variety meats which included the issuance of import permits and transportation slowdowns (USDA FAS report 2005). The table below shows the imports of pork including offal. According to Meat Processing (2006), China stands as the second largest importer of edible pig offal products with pork hearts, stomachs, feet and ears being particularly popular.

As for exports, the outbreak of SARS in 2003 and AI in 2004 has made many Chinese consumers switch to pork meat which explains the reduction of Chinese pork exports.

The largest destination market for China's exports remains Hong Kong, while other important destination markets include North Korea, Russia, Japan, Singapore and Malaysia (USDA FAS report 2005 & 2006).

Dong and Jensen (2004) reported that exports to the United States and European Union were precluded due to diseases like Food-and-Mouth Disease (FMD). Lower prices are expected to give raise to China's growing exports to developing countries' markets. The presence of FMD, will make it rather problematic for China to penetrate new markets in developed countries where sanitary and phytosanitary standards are more important than prices

Table 10: Pork imports in 1.000 metric tons **(carcass weight equivalent)**

Pork Imports	2001	2002	2003	2004	2005(p)	2006(f)
Japan	1,068	1,162	1,133	1,302	1,339	1,200
Russian Federation	528	834	725	629	675	700
United States	431	486	538	499	464	454
Mexico	294	325	371	458	420	450
Hong Kong	260	275	302	332	305	313
Korea, South	123	155	153	220	328	235
Romania	63	106	133	179	185	180
Canada	91	91	91	105	139	160
Australia	38	55	67	77	99	99
Ukraine	2	2	10	52	75	60
China, People's Republic of	**123**	**188**	**194**	**92**	**41**	**50**
Others	121	138	165	139	126	123
Total	**3,142**	**3,817**	**3,882**	**4,084**	**4,196**	**4,024**

Source: USDA FAS Livestock and Poultry: World Markets and Trade (2006)
Notes: EU data includes 25 member states for all years.
(p) preliminary; (f) forecast

Table 11: Pork exports in 1.000 metric tons **(carcass weight equivalent)**

Pork Exports	2001	2002	2003	2004	2005(p)	2006(f)
European Union	1,135	1,158	1,234	1,463	1,380	1,450
United States	707	731	779	989	1,207	1,250
Canada	728	864	975	972	1.083	1.110
Brazil	337	590	603	621	761	625
China, People's Republic of	**139**	**216**	**282**	**383**	**331**	**300**
Chile	32	59	80	102	129	174
Mexico	61	61	48	52	59	65
Australia	67	78	74	59	53	55
Korea, South	42	16	17	10	5	10
Ukraine	2	1	12	8	6	10
Romania	0	0	0	5	2	3
Others	15	13	15	17	1	1
Total	**3,265**	**3,787**	**4,119**	**4,681**	**5,017**	**5,053**

Source: USDA FAS Livestock and Poultry: World Markets and Trade (2006)
Notes: EU data includes 25 member states for all years.
(p) preliminary; (f) forecast

In comparison, the Netherlands exported 4 million piglets, 2.9 million slaughter pigs and 635.000 tons of pork in 2005. That same year Dutch pig sector's exports increased to 1.25 billion kg which led to an increased export value of 2.2 billion (PVE, 2006). According to research institute LEI (2006), total Dutch agricultural exports exceeded 50 billion euros.

Trade Barriers with the Netherlands

The Chinese government has currently issued certain restrictions on the import of Dutch agricultural products of animal origin. For fear of BSE, dioxin contamination, and Blue Tongue, the country has banned animal-related products from the Netherlands. The Chinese government stated that these measures were a necessary means to protect public's health. At present, Dutch officials are still negotiating with Chinese authorities on the resumption of the importation of animal related products. All necessary formalities will take time, as Chinese officials insist on implementing their own risk assessments. Pork imports from the Netherlands to China are expected to be permitted in the near future as soon as a bilateral protocol has been agreed upon.

While formally, the Chinese government has banned animal-related imports from the Netherlands, research shows that small quantities still enter the country. A report from LEI (2006) shows that pork exports from the Netherlands to China was valued at 874.000 euro in 2004 and 1485.000 euro in 2005.

For more information about the present situation, please contact the LNV-office at the Embassy of the Kingdom of the Netherlands in P.R. China (www.nlpekagr.com), or the VIP of Product Boards for Livestock, Meat and Eggs (PVE) (bedrijfsnet.pve.agro.nl/).

Chapter 6 Food Safety

Higher living standards in all spheres of life combined with knowledge of nutrition, have led consumers to demand for more reliability, consistency, and accountability of food products. Future competition in the Chinese meat industry will depend more on meeting quality and safety standards than on quantity and price.

While the Chinese government is attaching greater importance to food safety, food poison incidents still occur regularly in China. A quality inspection control showed that 10% of Chinese meat fails quality inspection. Most of this inferior meat in China contains too much water or fails freshness standards (www.english.people.com.cn, 2005). It appears that many Chinese enterprises, especially small private ones, are too eager to make quick and big profits at the expense of quality. This leads to situations where additives exceed national standard, unlicensed slaughtering takes place, and pigs are being pumped with water in order to get a higher price from slaughterhouses. It should be noted that few slaughterhouses in China pay according to carcass weight.

Nevertheless, there is a growing awareness among Chinese people that food safety starts at animal production farms, where farmers feed their animals. Meat safety can only be guaranteed if every step in the meat production chain is carefully monitored and controlled. The Chinese government has implemented several laws to improve present situation. Recently, there is a push from the industry that supports more pro-active government action. Leading meat producers and major retailers find it important that government authorities take food safety measures which affect the whole food supply chain. A "pollution-free food" action plan has been implemented during the 10th Five-Year Plan period which steadily improved the quality of animal products and feed (www.worldpoultry.net, 2006). Newly established food safety regulations require farmers to alter their way of thinking and established business practices. Farmers need to realize that food safety begins on their farms, or risk loosing their business.

Monitoring Difficulties

A major problem lies in the fact that China sees a large number of small farmers whom constitute around 80% of the country's total farmers. The country practices socialist public ownership of land which means that *"no units or individual may encroach on or transfer land, through buying, selling or other illegal means"* (www.chinadaily.com.cn, 2006). In other words, collective land ownership makes it difficult for farmers to increase farm size and invest in mechanized equipment. The large number of small farmers presents a major obstacle in organizing, monitoring, and standardizing the quality of all products. Therefore, despite all new regulations, it remains a problem to monitor chemical and seed use to enforce green food standards, ensure sanitation in slaughter of livestock, and certify non-genetically modified food products.

Case example: Food Safety Problems

A recent food incident in Shanghai illustrates how food safety is still a major issue in the Chinese meat industry. Newspaper China Daily (2006) reports how many farmers are still illegally feeding their pigs a toxic chemical that is dangerous to humans when they consume the meat of these animals. This incident saw more than 300 people taken into hospitals after eating pork meat containing the chemical clenbuterol. Farmers feed their pigs small amounts of this drug in order to improve their muscle ratio and shorten their growing period. However, research showed that clenbuterol can damage people's nervous and cardiovascular system which explains its ban since the 1990s. The illegal feeding of drugs stops several weeks before the pigs are slaughtered which explains why it is hard to detect the chemical. As for now, it remains a mystery to government officials how these poisoned products with health certificates got into the system. Local food authorities state that not every pig can be tested due to the high costs involved. A test kit for 100 samples reportedly costs 3,000 RMB (US$375). Food experts point out that this latest incident once more reflects the many flaws in the food inspection system, where too many government departments are involved that do not co-operate.

The incident above shows how a situation can go wrong directly at the beginning of the food supply chain. Besides the illegal feeding of chemicals, meat could get contaminated during various links of the chain, for example, during the (illegal) slaughtering, or during transportation to retail outlets, sometimes meat is even stored outside without proper cold storage. This example makes clear that government authorities cannot control and monitor every link in the food supply chain.

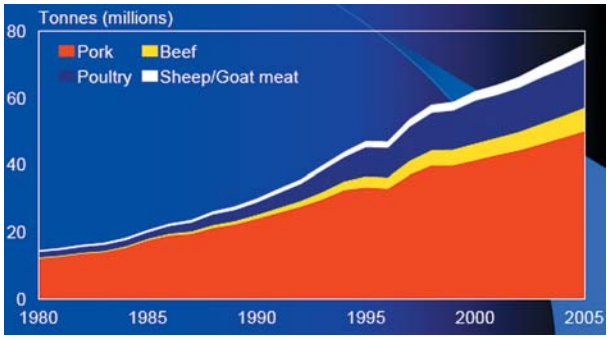
- Food safety inspection -

Chapter 7 Opportunities & Trends

At the moment, pork is the most produced and consumed meat in China, and expectations are that it will remain so in the near future. Hog production will continue to expand in volumes, but its relative share will slightly decrease in favor of other meats. In addition, hog production will see a shift from backyard farming towards more large-scale integrated operations. The central government is promoting the concept of a modernized agricultural landscape in its Five-Year Plan. Intensification brings forth opportunities to international firms that concentrate on improving production conditions through for example better feed or genetics.

The domestic meat industry is expected to see further consolidation in its slaughtering sector, with the number of large-scale commercial slaughterhouses growing, and outdated slaughterhouses & processing plants being modernized. It is expected that demand for advanced slaughter equipment and quality assurance systems will therefore increase as well.

Figure J: Meat production in China



Source: Zhou (2006)

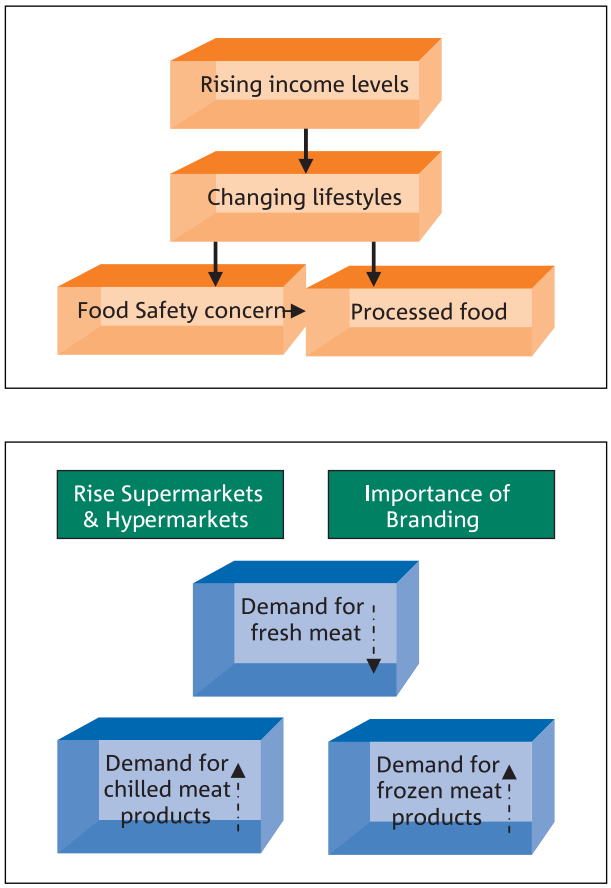
The figure above reflects China's meat production pattern, which follows the same line as the country's changing consumption pattern. While the production and consumption of pork still dominates, the proportion of beef, poultry and sheep/goat production shows more relative growth. It is forecasted that this pattern will continue in the near future.

A factor that could limit future production lies in the availability of feed as demand will likely surpass domestic supply due to the country's land scarcity. Still, expectations are that production and consumption will both keep on growing. Research shows that demand for pig by-products has been exceeding domestic supply for a number of years and will continue so in the future. Considering the popularity of variety meat among local and large price differential in by-products, Dutch export to China could prove to be profitable business.

Rising income levels in combination with changing life-styles and more concern for food safety, has led to more consumption of processed food products in mostly urban areas. This trend has been fueled by widespread news on animal diseases and numerous food poison incidents in the country. At the moment, inadequate distribution infrastructures in China's lesser developed regions are restricting the penetration of frozen processed food in rural areas.

Nevertheless, penetration of supermarkets/hypermarkets into rural areas, and rising income levels that lead to increased sales of refrigerators, freezers, and microwaves, will give likely give rise to demand for chilled and frozen meat products in forthcoming years.

Figure K: Demand for processed food



While the country's accession to the WTO has led the central government to lower its tariffs on farm imports, agricultural imports of animal origin are still periodically confronted with non-tariff barriers such as sanitary and veterinary measures and technical barriers to trade, which makes it difficult for foreign companies to expand their export business in China. These international trade barriers are often politically influenced and lifting bans requires considerable time and effort. For this reason, some international companies have suggested the idea that production in China through partnerships or acquisitions might be a more viable option to avoid these issues.

Doing business in China

Once the decision has been taken to conduct business on the Chinese market, a company needs to determine the right mode of entry. Several options are available through which a firm can enter the Chinese market, ranging from sales representatives to joint-ventures to a wholly owned foreign enterprise. For this reason, a company has to consider its level of commitment, risk control, and the profit potential attached to each alternative carefully. A number of challenges need to be overcome such as an unknown culture, legislation, tax system, and possible imitation of brands/goods/technology. In this sense, cooperation with a Chinese company might be a good option, as local companies possess more knowledge on conducting business in China. An industry expert noted that foreign firms aiming to sell machinery equipment in China have a hard time competing on prices. These companies need to compete on quality, and it is therefore essential to have local offices in place that provide after-sales support.

For more information, please visit the website of the Economical Network of the Kingdom of the Netherlands in the People's Republic of China, www.hollandinchina.org.

References

- Agricultural Economics Research Institute/LEI (2006), "Agricultural Economic Report: Summary", The Hague.

- Bean, C., Sanchez, J., Zhang, J., and Hackenburg, S. (2006), "China, People;s Republic of, Livestock and Products, Annual Report", USDA FAS, GAIN Report nr CH6074, September 7.

- Bean, C. and Zhang, J. (2005), "China, Peoples Republic of, Livestock and Products, Semi-Annual", USDA FAS GAIN report nr CH5010, January 31.

- Bean, R. (2003), "China, People's Republic of, Retail Food Sector, Annual", USDA FAS GAIN report nr CH 3825, November 12.

- Bean, R. (2006), "China, People's Republic of, Retail Food Sector, All China Retail Report", USDA FAS GAIN report nr CH6804, March 9.

- Euromonitor International (2006), "Packaged Food in China", country report, 17 March.

- Fabiosa, J.F., Hu, D., and Fang, C. (2005), "A Case Study of China's Commercial Pork Value Chain", MATRIC Research Paper 05-MRP 11, Iowa State University, August.

- Gale, F. and Reardon, T. (2004), "China's Modernizing Supermarket Sector Presents Major Opportunities for U.S. Agricultural Exporters", AgExporter magazine, USDA FAS, pp 4-8.

- Harris, C. (2006), "By-Products-The Fifth Quarter", Meat Processing, November 6.

- Hayes, D. and Clemens, R. (1997), "The Chinese Market for U.S. Pork Exports", Briefing Paper 97-BP 14, Center for Agricultural and Rural Development, Iowa State University, March.

- Kinsey, J. (2004), "Food Safety and Security Issues in Agrofood Policy and Global Trade", Applied Economics Department, University of Minnesota, August 28 - September 1.

- Kotler, P. (2000), "Marketing Management", The Millenium Edition, Prentice Hall, International Editions, pp 404.

- Ministry of Agriculture (2006), "Brief Summary of 11th 5-Year Plan (2006-2010) for Development of Animal Husbandry Nationwide", presentation.

- Ministry of Agriculture (2005), "China Agriculture Yearbook", China Agriculture Press, Beijing, People's Republic of China.

- Ministry of Agriculture (2005), "China Agricultural Development Report", China Agriculture Press, Beijing, People's Republic of China.

- National Bureau of Statistics of China (2005), "China Statistical Yearbook", China Statistics Press, Beijing, People's Republic of China.

- National Bureau of Statistics of China (2006), "China Statistical Yearbook", China Statistics Press, Beijing, People's Republic of China.

- Naughton, B. (2005), "The New Common Economic Program: China's Eleventh Five Year Plan and What It Means", China Leadership Monitor, Fall 2005, issue 16.

- Pan, C. (2000), "Chinese meat industry overview", Rabobank International.

- Pan, C. and Kinsey, J. (2002), "The Supply Chain of Pork: U.S. and China", Working Paper 02-02, the Food Industry Center, University of Minnesota, March.

- Patton, D. (2006), "Chinese meat processors seeking added value", June 8, http://www.meatprocess.com/news/ng.asp?id=68288.

- Patton, D. (2006), "Foreign investors fighting for Chinese meat processor", April 18, http://www.meatprocess.com/news/ng.asp?id=67106.

- Product Boards for Livestock, Meat and Eggs (2006), "Livestock, Meat and Eggs in the Netherlands", Van Deventer, 's-Gravenzande.

- Reardon, T., Timmer, C.P., and Berdegue, J.A. (2003) "The Rise of supermarkets and Private Standards in Developing Countries: Illustrations from the Produce Sector and Hypothesized Implications for Trade", paper presented at International Conference, Capri, Italy, June 23-26.

- Sanchez, J. and Wu, X. (2006), "China, People's Republic of, Agricultural Situation, China Flash I.15", USDA FAS, GAIN report nr CH6080.

- Wang, R. (2006), "China - Pork powerhouse of the world", Jinnai Agribusiness Research Center, China Agricultural University, Beijing.

- Wu, C. (2003), "China Logistics Profile", USDA FAS, GAIN Report nr CH3833.

- USDA FAS (2006), "Livestock and Poultry: World Markets and Trade", March.

- Zhou, G. (2006), "The changing dynamic in China: the development of meat industry and consumers", presentation at World Meat Congress in Brisbane, Australia, April 28.

Consulted persons

- Maarten Buitelaar, Managing Director Unisono
- Henk van Duijn, Counsellor for Agriculture, Nature & Food Quality
- Jiqin Han, Deputy Director at Nanjing Agricultural University
- Nick Hong, Senior Agricultural Officer
- Marina P.C. Ng, Senior Agricultural Officer
- Gabrielle Nuytens, Attach for Agriculture, Nature & Food Quality
- Chenjun Pan, Senior Industry Analyst at Rabobank Beijing office
- Bert Treffers, General Manager Meat Processing Systems Beijing
- Yong Feng Wang, Senior Agricultural Officer Beijing

Websites

CBS
www.cbs.nl
China Daily
www.chinadaily.com.cn.
EVD
www.evd.nl
Government's official web portal
english.gov.cn.
Meat Process
www.meatprocess.com.
National Bureau of Statistics of China
www.stats.gov.cn
World Poultry
www.worldpoultry.net
USDA ERS
www.ers.usda.gov
USDA FAS
www.fas.usda.gov

Pictures

Cover: LNV database

1) LNV database
2) http://blog.donews.com/images/blog_donews_com/chowa/20417/o_%E4%BA%BA%E6%B0%91%E5%A4%A7%E4%BC%9A%E5%A0%82.jpeg
3) http://homeimg.focus.cn/photo/392797/%CD%BC%C6%AC%A3%BA%BB%B9%D3%D0,%B4%F3%D6%ED%D0%A1%D6%ED.JPG
4) http://img.diytrade.com/cdimg/321674/1195529/0/1105757970.jpg
5) http://www.fas.usda.gov/pecad/remote/china/chinamap.gif
6) MPS database
7) http://www.paulnoll.com/China/Commerce/trans-pig-pole-big.jpg
8) http://www.carto.net/neumann/travelling/china_tibet_2001/16_lhasa_market/05_market_table_with_open_meat.jpg
9) LNV database
10) http://www.ourglobaltrip.com/viewday.php?dayID=265
11) http://media3.washingtonpost.com/wp-dyn/content/photo/2005/11/04/PH2005110400989.jpg

Ministry of Agriculture, Nature
and Food Quality of
the Netherlands