

AN ASSESSMENT OF CHAIN MANAGEMENT PRACTICES WITHIN THE INDUSTRIAL PORK VALUE CHAIN; BEIJING CITY, CHINA



**A Research Project Submitted to Larenstein University of Applied
Sciences in Partial Fulfillment of the Requirements for the Degree of
Masters in Agricultural Production Chain Management, Specialization
Post Harvest Technology and Logistics**

By

Ma Wenzhao

October 2008

Wageningen

The Netherlands

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Post bus 411
Tel: +31 31 7486230
Fax: +31 31 7484884

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LIST OF ABBREVIATIONS

HACCP	-	Hazard Analysis Critical Control Points
ISO	-	International Organization for Standardization
FAO	-	Food and Agriculture Organization
CCP	-	Critical Control Points
GDP	-	Gross Beijing Product
RFID	-	Radio Frequency Identification
VCA	-	Value Chain Approach
HPAI	-	Highly Pathogenic Avian Influenza
IKB	-	Integrated Quality Control
PVE	-	Product Board for Livestock, Meat and Eggs
BPPA	-	Beijing Pork production Association
R&D	-	Research and Development
PVV	-	Product Board for Livestock and Meat
PPE	-	Product Board for Poultry and Eggs
QA	-	Quality assurance

PREFACE

This Msc final thesis is written by a master student from Van Hall Larenstein. It is his final assignment before graduation.

The title of this paper is “An assessment of quality management practices within the industrial pork value chain, Beijing city, China”. The research was not only a big challenge to the author, but also an opportunity to learn a lot about the pig and pork industry in Beijing. It gave the author a great experience of doing a research and thesis writing. It is an honor to the author to do this research under the guidance of Mr. Frans Verweij, a specialist from Larenstein. It was a pleasure to be his student.

Wageningen,
October 2008
Ma Wenzhao.

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Last but not least, I particularly thank my parents for encouraging and supporting me during my oversea study! I also thank to my girlfriend (ShiYue) and many friends in Wageningen!

ABSTRACT

The research assesses the value chain and quality control of the pork industry in Beijing municipality of China. Through interviewing all the actors of pork industrial value chain in Beijing, the roles functions and problems of each of the actor of the pork industrial value chain of Beijing were investigated and discussed. Finally relevant suggestions and recommendations were offered for further improvement.

The author used survey and case study to explore the pork industrial value chain of Beijing. The investigations were carried out among pig farmers in seven selected districts of the Beijing municipality. The case study worked on an integrated evaluation of the pork industrial value chain. And the major actors of this chain included: pig farmers, brokers, processor, wholesalers, retailers and consumers.

Empirical data from the research were used for this assessment of the pork industrial value chain. Descriptive statistics were collected. Through comparing the profit and responsibility in the actors of the value chain, the main results obtained from survey (focusing on pig farmers) and interviews (among brokers, managers of slaughterhouses, wholesaler markets, open markets and supermarkets), were the descriptions of the roles of each member and their current situation about quality control in the pork industry value chain in Beijing.

According to this research, the slaughterhouses have taken up the lion share of the chain's gross gain. By contrast, the broker, transporter and wholesaler market shared only a little amount of the rest of the profit. Regarding to the quality control, the quality system of HACCP is not universally and strictly followed by each member. Therefore, it is very necessary to make recommendations for a new industrial value chain system and an improved quality control system.

Key words :

Pork production value chain, survey, case study, pork quality control system.

CHAPTER 1 INTRODUCTION

1.1 Background of the study

Pork is not only a traditional animal protein in the Chinese diet, but it is also the cheapest compared with other red meats. China's pork production, which comprises over half of the world's total, is forecast to increase 4.7 percent to 52 MMT, but the pace of growth is forecast smaller than that of 2005. In recent years, significant profits have resulted in rapid production and supply increases, and China's pork industry is expected to enter a stable and lower priced period from 2006 (Jian P. 2006).

Although many Chinese consumers have shifted to red meat due to HPAI in China, pork prices did not go up like beef and sheep/goat meat. On the contrary, pork prices started falling considerably in the second half of 2006 as the result of surplus supplies. According to the industry, swine farmers also started losing money in November 2006. The price ratio between swine and grain dropped to 1:5.45, lower than the publicly accepted critical point 1: 5.5. Swine procurement prices in main producing provinces like Henan, Jiangsu and Hebei were only \$0.94/kg in the last quarter of 2006 (prices were \$1.2/kg in the same period of the previous year). Seventeen provinces are below the critical point, while 13 provinces are above it. The more competitive producers are in remote areas or in feed grain production areas with lower production costs (Jian P. 2006). However irrespective of these challenges, the China pork industry has continued to grow as revealed in table one (1) below.

Table 1: Growth in the Number of Commercial Swine Farms in China

Number of Head Kept on Farm	2003	2004	2005
50 - 99	790,307	851,429	1,056,793
100 - 199	212,909	249,016	328,811
200 – 1,999	27,495	33,844	46,175
2,000 – 9,999	3,242	3,388	4,162
10,000 – 49,999	862	911	1,048
Over 50,000	28	30	44
Total	1,034,843	1,138,618	1,437,033

Source: China Swine Association 2006

1.2 The Pork Industry in Beijing

Beijing is situated in the north east of China as shown in picture one (1) below and has a monsoon-influenced humid continental climate with four distinct seasons. Beijing is one of the biggest cities in China; it is political, economic and cultural central of the people's republic of China. Administratively, the Beijing municipality equals the status of a province, reporting directly to the central government. (<http://www.legendsofchina.com/beijing.htm>)

In 2005, pig consumption per capita in Beijing was 45.7 kg, compared with 40.6 kg in 2000. This is higher than the average kg in China (average is 42 kg in 2005). The share of pork is about 69% of total meat production in 2005. The main pork production distribution channel in Beijing is from pig farmers to slaughterhouse, supermarket. (Source: Wang G.X., 2006 Analysis of Chinese pork Industry)



Picture1: Map of China Showing Beijing

Source: <http://english.people.com.cn/data/province/beijing.html>

1.3 Problem Statement

The pork consumption is increasing every year and it is common to see that small farmers raise pig in a small scale as a kind of supplement for family income. In Beijing, the capital city of China, totally about 138,000 farmers had pigs at their yard and majority of them are small scale pig farmers (China swine association 2006). However, this big group of small scale farmers is the one who usually run after the prices increasing. Because of lacking market information and control, they usually rush into the market and produce more pigs when pork price increase. In fact, the cyclic shortages in meeting market demand for pork within Beijing is related to the fact that small scale pig farmers, due to a number of reasons, have not been able to supply sufficient quantity and quality of pork meat through out the year. To find the way to manage them efficiently will be a great help for both small scale farmers and Beijing pork industry.

1.4 Research Objective

The objective of this study is to assess the pork industrial value chain in Beijing, China, and then formulate suggestions to encourage pork production by small scale pig farmers.

Central Research Question

What is the current situation of the pork industrial value chain in Beijing, China and how can the value chain be improved to empower the small scale pork farmers

Sub Questions

- i. Who are the chain actors and how do they function in the value chain?
- ii. What are the constraints in the value chain affecting small scale farmers in pork production?
- iii. Who are the chain supporters and influencers and how do they function in the pork industrial value chain?
- iv. What is the distribution of the margin shares to the different actors in the chain?
- v. How does the value chain deal with pork quality control?
- vi. What are possible actions can be taken to improve the pork industrial value chain so as to encourage small scale farmer production?

1.5 Justification

According to (Luo S.Q.,2008) small backyard and family farms still form a large sector, probably 50-60% of production with the pork industry of China. Realistically, land constraints prevent the Chinese pork sector from expanding significantly, however China must face the reality of a growing population and increased per-capita demand for meat products (Hu D.H., 2007). Hence the small scale pork farmer is a reality in the Chinese pork sector and an important one in terms of production. Therefore improving the value chain to encourage the increase production of pork by small scale farmers within Beijing will contribute towards minimizing pork shortages within the industry.

1.6 Outline of the Study

This study is organized into six main chapters. Chapter 1 is about an overview of the pork industry in China with a focus on Beijing city. It describes the research objective and links the research problem with two main research questions. In Chapter 2 the concept of value chain analysis is reviewed along with the Chinese pork industry. This chapter reviews industrial pork china with small scale farmers. Chapter 3 deals with the research methodology elaborating the research area, tools used and the data analysis. Chapter 4 consists of the empirical findings of the research and Chapter 5 covers the discussion of these findings. The report ends with Chapter 6 that formulates the conclusion and recommendations of the study.

CHAPTER 2 LITERATURE REVIEW

2.1 Overview about pig production in Beijing

In order to meet the demand of pork consumers, Beijing began to develop pig production from the 1990s. Many large-scale pig farms were established in the near and far outskirts. The pig production capacity increased from 3.502 million in 1997 to 5.002 million in 2005, when the pig production reaches to its peak value. Table two (2) show the pig sales and storages amounts in Beijing within the last ten years.

Table 2: Pig sales and storages in Beijing within the last ten year

Years	Sales amounts (million)	Storage amounts (million)
1997	3.502	2.503
1998	3.748	1.704
1999	3.454	1.956
2000	4.083	2.306
2001	4.347	2.351
2002	4.501	2.357
2003	4.625	2.463
2004	4.902	2.767
2005	5.002	2.931

Source: Beijing statistics year book 2006

The development can be described in three stages: The first stage is from 1997 to 1999. Due to the fluctuating market price of feeds, piglets and pork, the price of pigs changed quite a lot during this period. In 1998, the price of corn (major pig feed) was stable; the proportion price between pig and grain was 6.2:1. Then, benefit of pig farming increases, and the pig production is at a picking-up situation. The number of annual slaughtered pigs is 3,784 million. In 1999, the price of corn increased from 1.35 RMB (Chinese Yuan) to 1.55 RMB per kilo. The proportion price between pig and grain is 5.5:1(Xin X., 2005). This is a great hit against the interest of farmers. The pig farmers reduced the number of slaughtered pigs, and many sows were slaughtered. So the pork production capacity decreased in 1999. The total slaughtering number is 3.454 million.

The second stage was from 2000 to 2004, a fast growing period. The economic reform triggered off institutional changes. The pig production capacity made a big step forward with the help of the Beijing municipal government. The numbers of large-scale pig farm increased, driving-up the level of pig production. Other contributing reasons included: application of new feed technologies, improvement of pig varieties, and evaluation of the level of immunization. The pig production capacity enhanced from 4.083 million in 2000 to 4.902 million in 2004, at a growing rate of 5% per year.

The last stage was from 2005, a stable development period. After the second period of rapid growth, the level of pig production in Beijing had already improved. At this point, the pig production had reached to a relatively high level. Under the circumstances of existing technology level and market demand, it is quite difficult to make a further substantial increase for the production output. (Beijing statistics year book 2006 chapter 7 211-217)

2.2 Production infrastructure

Approximately 70% of Beijing's pig population is in the outskirts, and the general infrastructure for pig farming is poor. Farmers usually build the pigsties in open-air, with concrete walls and roofs. Most of the large and medium -farms can be divided to different compartments to facilitate breeding, growing (pigs of different ages can also be raised in different compartments), and protecting the pigs from diseases. Most of pig farmers have limited equipment for the storage, disposal and effluence of water. Some of large-scale pig farmers have already started to use bio-digesters to disposal the dejection which is very significant. It will reduce cost and increase the profit. (Chen Q.M., Wang C.L., 2004.)

2.3 Pork distribution

The major distribution channel is to sell the whole slaughtered pigs to the wholesale market. Another distribution channel is to sell the segmented pigs directly to some large supermarkets. In Beijing, altogether 18,000 pigs are sold everyday; and at least 1,000 pigs can be sold at each slaughterhouse (14 in total) every day.

There is only one agent (broker) in a wholesale market for each slaughterhouse. The brokers will visit the slaughterhouse every day, and tell how many pigs they need and do the payment. Then, they return to the wholesale market together with the transport vehicles. They usually pay cash to the slaughterhouse. The large supermarkets usually call the slaughterhouse, tell how many pigs they need and then pay in advance through internet system to the slaughterhouse.

It is estimated that more than ninety percent (90%) of pork are sold as whole part of pig. Only ten percent (10%) of pork are sold to large supermarkets in segmentations. All the pork, which can not be sold out at the wholesale market or the supermarkets on that day, will be returned back to the slaughterhouses. The pork will be reprocessed into frozen meat or into other value-adding products, such as sausages, hams and lunchmeat.

On the condition of current pork market, there is limited room for increasing quantity; however, it needs more improvement on the quality. With the development of public awareness and social progress, it is extremely important to enhance the quality of pork and build brand pork group. Definitely, this is the trends for the pork industrials and innovation. (Lu F.J., Ye J., 2003.)

There is a need of pork grading system for pork industry. Without such a system, Beijing's pork production has remained non-standardized, and the added value of high-end pork cannot be realized. This is imperative for Beijing's pork enterprises as the profit level is low because of rising costs. (The Office of Rural Affair Committee of Beijing Municipal Government, 2007.)

2.4 Pork consumption

During the period 1997-2006, the total consumption of pork production in Beijing increased by 150 million kg (from 380 million kg in 1997 to 538 million Kg in 2006). Per capita consumption also increased by approximately twenty-one percent (21.4%), up to 45.3Kg per person in 2006 (see table 3). Actually, this consumption level is a little bit higher than the global per capita consumption and is relatively higher than the average level of many developing countries. FAO estimates that the global average per capita meat consumption is around 39.5 Kg per person in 2006; and the average per capita meat consumption in developing countries is around 32.2 Kg while that of developed countries is around 48.3Kg per person;(http://www.fao.org/index_zh.htm)

Table 3: Pork consumption per person from 1997 to 2006

Year	Meat consumption per person(Kg)
1997	37.3
1998	38.9
1999	38.8
2000	40.2
2001	41.6
2002	42.5
2003	43.3
2004	45.1
2005	45.6
2006	45.3

Source: Beijing statistics year book 2007

Pork is the most popular meat for consumption in Beijing City. Pork meat consumption in Beijing accounts for 69.5% (See figure 1) of the Beijing's total meat consumption, followed by poultry (15%), beef (10.5%) and mutton (5%). (Source: Collection of agricultural production, 1999 to 2006)

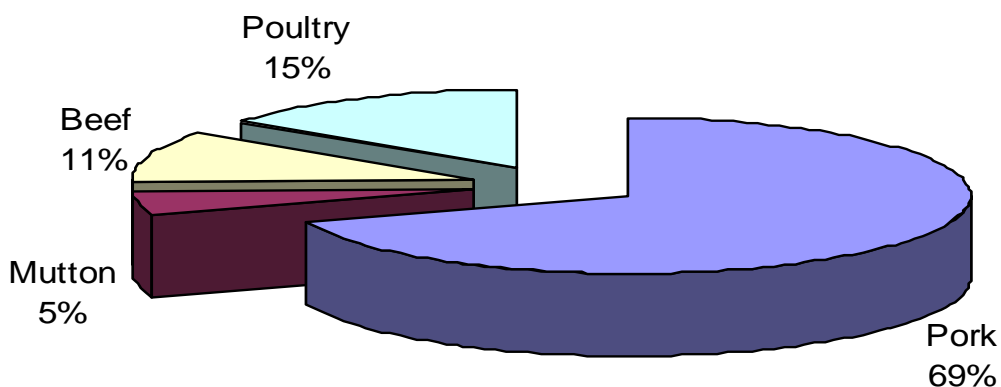


Figure 1: Meat consumption in Beijing

As the quality standard of pork is upgrading, the price goes up (Zhao Z.P. 2007). Table four shows the areas for pig production in Beijing from 2001 up to 2005. According to the data from table 4, the pig production is decreased in peri-urban areas and suburban areas. The middle areas show gradual expansion.

Table 4: Areas for pig in Beijing

Years/ Areas	Peri-urban areas	Middle areas	Suburban areas
2001	14.7%	62.3%	23%
2002	14.2%	63.5%	22.3%
2003	13.4%	64.9%	21.7%
2004	12.6%	66.0%	21.4%
2005	12.0%	67.1%	20.9%

Source: Beijing statistics year book 2006

2.5 The essential influencing factors for the pig production

Because the long cycle of pig production, many factors can impact the pig production. Particularly vulnerable influences come from feed production and market demand, such as the price of grain and the price of pork. At the same time, the government also plays a key role in policy-making to support the pig production.

The input of pig farmers mainly include: feed, piglet's price, labor costs, vaccines and veterinary drugs. In economic theory, the total cost of product includes two parts: fixed cost and variable cost (piglet's price, feed and so on). If the revenue is higher than costs, the farmers will get benefits, otherwise they will lose money. Embodied in pig production, if the total price sold for pig production is higher than costs, producers will continue to produce. Feed cost occupies a big proportion of the total cost. So it is very important to decrease the feed cost of pig production. (Liu F., 2002.)

The main substitutes for pork include beef, mutton, chicken, eggs and so on. When the prices of these products increase or decrease, there is a twofold impact is for the pig production. In one hand, the lower price of other substitute products can reduce the demand of pig production. On the other hand, when the pork price is lower than other substitute products, the producer will increase the pig production to satisfy the increased demand. As the cross-elasticity of pork is higher than zero (Xin X., 2005) , the final substitute price increase (decrease) will increase (decrease) the consumption of pork, and the pig production will increase (decreases). In 2006, the prices of Beijing chicken and eggs were low, as a result, the pig production rate was decreased. (Zhao Z.P. 2007)

2.6 Value Chain

A value chain is defined as a chain of various actors. Products pass through all the actors of the chain in order, and at each actor the product gains some value. (Mabert V.A., 2003)

The basic idea of the value chain structure is to recognize the interdependency among the chain actors. And the modification and control of the chain should be based on some significant factors, such as integration of business processes, and information flow.

It is becoming an important and essential issue to manage the value chain right now; the concept of value chain management has been adopted by many business leaders as a significant method to assist in designing, controlling and managing the network of facilities and tasks that comprising of the many stages of the value chain. (Mabert V.A., 2003)

2.7 The Netherlands Pork industry

According to Agra CEAS Consulting in association with Department of Agricultural Sciences Imperial College (University of London, 2003), the Netherlands pig sector is very much market led and this is facilitated through the Integrated Quality Control (IKB Integrale Keten Beheersing). Introduced in 1992 this voluntary scheme now encompasses more than 90% of slaughterhouses. Fresh meat processing firms, butchers and multiple retailers are also part of the initiative which provides a quality mark which demonstrates to consumers that the meat has been produced to certain standards, offers traceability and guarantees meat safety.

The pig industry is bound together by the Productschappen Vee, Vlees en Eieren (PVE, Dutch Product Boards for Livestock Meat and Eggs) is a joint secretariat of the Productschap Vee en Vlees (PVV, Product Board for Livestock and Meat) and the Productschap Pluimvee en Eieren (PPE, Product Board for Poultry and Eggs) that are

themselves statutory trade organizations which are authorized to make binding rules for each of their industries. The PVE's role is to develop and manage a range of services to improve the overall performance of the two meat industries. In particular the group develops and manages:

- Animal health and welfare QA (Quality assurance) systems;
- Inspection and classification systems for carcasses;
- R&D and promotional activities;
- Technology transfer programmes;
- New market opportunities.

In addition to this role it is also becoming increasingly responsible for the enforcement of compliance rules. (Details about PVE, please find it in annex 8)

CHAPTER 3 METHODOLOGY

3.1 Study Area

The map of Beijing (picture 2) below shows, from number one (1) to four (4) illustrate the urban area of Beijing, from five (5) to eight (8) are the surrounding peri-urban zone, and the others are the rural area in Beijing. The research was conducted with seven (7) districts: Haidian (number 7), Fengtail (number 8), Changping, Tongzhou, Miyun, Daxing and pinggu district of Beijing city, China. According to Government statistics, the Beijing's total population topped 18.4 million as per December 2007. The population figure involved just over 13 million official residents in the household register and 5.4 million in the floating population. (Source: <http://english.people.com.cn/data/province/beijing.html>). Beijing city is composed of eight (8) districts as revealed in the picture 2 below.



Picture2: Map of Beijing City

Source: <http://image.baidu.com/i?ct=503316480>

The city has a total area of 16,800 sq km. In a review of the livestock sector in Beijing the growing demand for meat in Beijing is clearly indicated, as well as the resulting increase in production. Follow an increase in per capita income in the period, more and more people can afford to buy meat. In combination with the large population growth in Beijing, this has resulted in a booming livestock sector around the city. (Source: <http://www.china.org.cn/english/China/234343.htm>)

3.2 Research Framework

The research used both qualitative and quantitative approach and was conducted basing on data, literature and documents. Data collection was implemented through a field study that involved a survey of small scale pig farmer in seven of the city districts and a case study of the industrial pork value chain.

3.2.1 Survey

The survey was carried out among pork farmers in the seven selected districts of Beijing city namely; Haidian(number 7), Fengtail (number 8) , Changping, Tongzhou, Mlyun, Daxing and Pinggu district districts which are areas of concentrated pork production within Beijing. These districts were selected because the study aimed to explore the pork industrial value chain in Beijing and thereafter formulate suggestions to encourage sustained pork production by small scale pig farmers. Thirty pig farmers were selected through selective sampling from the total number of pig farmers operating in the selected districts. The sampling was carried out by using the farmers' register held by the local authorities associated with livestock departments. Questionnaires were used to collect empirical data from the pig farmers. The questionnaires focused on small scale farmer, especially the constraints in the value chain that affect small scale farmers, and margin shares by small scale farmers. Also, issues like quality control, price and production are explored. Last but not least, the author also pays attention to the issue of how to improve the pork industrial value chain so as to encourage small scale farmer production. (Related to Sub Questions 1, 2, 4, 5 and 6).

3.2.2 Case Study

The case study involved an evaluation of the pork industrial value chain. The different chain actors were interviewed in collecting first hand data form the field. And all these actors have been selected by officials who are working on one of these kinds of case studies in Beijing Agricultural department. There are 27 interviewees: three (3) brokers, one (1) processor, two (2) wholesalers, five (5) retailers, three (3) workers in government and thirteen (13) consumers. In addition, officers who are working in the livestock departments of local government were visited and consulted on a number of related information. Interviews focused on issues related to the involved actors, how they function in the pork industrial value chain; what the distribution of the margin shares to the different actors is in the chain; how the value chain deals with pork quality control; and the possible actions that can be taken to improve the pork industrial value chain so as to encourage small scale farmer production (Related to Sub Questions 1, 3, 4, 5 and 6).

3.3 Data Analysis

Besides first hand data collected from case study, second hand data from the research was used in assessment of the pork industrial value chain in Beijing. The Value Chain Approach (VCA) was employed to analyze the current pork value chain and provide insight into the actors' roles. The margin shares of actors were compared between the different types of actors in order to get clear idea on the distribution of added values. The study also diagnosed the bottlenecks that the actors face and the opportunities within the pork chain. Chain empowerment theory was used to design the new pork value chain used to analyze the business environment within the pork industrial value chain.

CHAPTER 4 RESULTS

4.1 Beijing Pork Industrial Value Chain

4.1.1 Survey among pig farmers

Traditional pig farmers, cooperative farmers and contract farmers are the main types of pig farmers in Beijing. Therefore the survey selected 16 traditional small pig farmers, 7 cooperative(middle-size) farmers and 7 contracted (large-size) farmers to collect information about their productions cost, benefit, quality control, sales channels and so on. The breeding cycle for the pig is about five and half months in small scale of pig farm and the cycle in middle and large scale of pig farmers, which is around five months (Because the quality of the feed is different). Table 5 shows the three different types of pig farmers in Beijing municipally.

Table 5: Type of pig farmers

Type \ Size	1-49	50-199	200-2000	>2000
Small scale of farmers	6	10	-	-
Cooperative with other farmers	-	-	7	-
Contract with slaughterhouses	-	-	3	4

The first type of pig farmer in Beijing is the traditional pig farmer. The characteristics of traditional farmers are: the number of pigs is too small; it is not easy for them to get information in time; they have difficulties in handling business risks, and the cost of operations is usually too high for them. Therefore it is not easy for them to control the quality of the pig production. Their scale of economy is rather small with less than 200 pigs per year. Two main drawbacks of small scale pig farmers are: first, the farmers are not aware of the developments in the consumers' demand, and they own the lack of market information. Second, traditional pig farmers do not get sufficient support from local (Beijing) government. The small scale farmers sell pigs to brokers, which is the only relationship between small scale farmers and brokers. And the small scale pig farmers can not sell the products to slaughterhouse directly, because few amount of money they offer will result in high transport cost. Meanwhile, the small scale of farmers wants to cooperate with slaughterhouse, in order to sharing more benefits (without the brokers).

The second type is the cooperative farmers who work with other famers in an organization or cooperation. They have more advantages than those of traditional pig farmers. The cooperative farmers have the advanced equipments to make the feed by themselves, so they do not need to buy high-cost feed from feed companies, which will help them to decrease some cost. One more reason is that the cooperative pig farmer's contact with slaughterhouses directly, which will improve their benefits.

The last type is the cooperation between farmers and slaughterhouses. This is a stable type; the farmers are not worried about where to sell the pigs. Moreover, the slaughterhouse will help them to control the quality of pig during their growing time, and also help them to transport the pigs. The cooperative farmers own equipments for making feed; and the total cost about feed become cheaper than that of traditional pig farmers. Therefore, they can take more profit than other types of pig farmers.

The table 6 shows results of survey on pig farmers focuses on the important aspects of pork price, quality and brand. Around 80% small scale of pig farmers thought that price is the most important issue, and the quality is the for more than 50% large scale of farmers. Only 13% of farmers thought that brand (the name of the piglet or the piglet company) is important. None of the farmers considered environment should be an issue to pay attention to.

Table 6: The first importance factor of the price of pig

Type Factor	Small scale of farmers	Cooperative with other farmers	Contract with slaughterhouse
Price	13	3	1
Quality	2	3	4
Brand	1	1	2
Environment	0	0	0

Cost and benefit will directly influence the enthusiasm of the pig farmers. It is also an important constraint for the development of pig production. In general, the cost of feed can account for 60% -80 % of the total production cost. The detail results are in 4.3. In Beijing, the major feed is corn. So, the price of corn plays a major role here. Piglets, labor costs, epidemic prevention, feed and management all contribute to the total cost of pig production. The difference between farm sales price and cost constitutes is the benefit. The higher benefit will bring about higher enthusiasm of the farmers, and hence higher production level. Otherwise, everything will become lower.

The government makes poor policies to support the development of pig farmers, especially for small scale of pig farmers, For example: the middle and large scale of pig farmers are not so difficult to loans money from the bank, but for the small scale of pig farmers are rather difficult.

The table 7 is shows the costs and benefits for three difference type of farmers in Beijing. The big scale of pig farmers (contract with slaughterhouses) are get the most benefits, the small scale of pig farmer's costs are higher than two of others and the benefits is rather less.

Table 7: Costs and benefits for pig farmers

Type Item	Small scale of farmers	Cooperative with other farmers	Contract with slaughterhouses
Total costs per pig	1415	1404	1395
GDP per pig	1454	1508	1476
Cost-benefit per pig	3.0%	6.0%	5.4%
Average costs per kilo	14.15	14.04	13.95
Average selling price per kilo	14.54	15.08	14.76
Benefits per Kilo	0.39	0.74	0.81

4.1.1.1 The main constraints among the pig farmers

The constraints that the farmers were referring to on a number of occasions can be summarized into five groups and these are listed below table 8 and 9:

Table 8: Constraints Experienced by Pig Farmers

No	Constraint	No. of Famers
1	Lack of timely access to information	21
2	Limited marketing channels	18
3	No quality control system	16
4	Fewer benefits and high business risks	23
5	Impact on living environment	21

Table 9: Detail constraints for different type of pig farmers

Type	Number	No.1	No.2	No.3	No.4	No.5
Small scale of pig farmers		15	15	16	15	13
Cooperative pig farmers		5	2	0	4	5
Large scale of pig farmers		1	1	0	4	1

Seventy percentages (70%) of pig farmers considered that lack of timely access to information and the impact on living environment are biggest constraints. All of the small scales of pig farmers (16) choose the no quality control system as the constraints, and more than seven six percentages (76%) of pig farmers believe that the limited benefit and high business risks are vital constraints for them.

1) Lack of market information

It was noted that the traditional pig farmers can not get sufficient market information in time. There is an imbalance between farmers' supply and the market demand. If the pork prices soar up, the traditional pig farmers will increase the pig numbers and production, which result in an over production and lower price in the next year. This

would be avoided if the government supply them sufficient dynamic market information.

2) Limited marketing channel

The traditional pig farmers have to sell their pigs to brokers without awareness of market price. Meanwhile, the farmers are not able to make contracts with the slaughterhouses and sell the pigs to slaughterhouse directly, because limited amount of pigs that will increase the cost of slaughterhouse's collection of pigs. Therefore the farmers have to sell pig to the brokers as the only choice and the brokers exploit them.

3) Quality control system

It was found that there is no quality system in pig farms. About quality control practices, farmers only observe the pigs. Based on their experience, they make judgment if the pigs are health or sick. Such a quality control system is not reliable because of different personnel opinions (bases on personnel opinions and not on scientifically measureable parameters) lead to different actions.

4) Fewer benefits and high business risks

The small-size pig farmers in Beijing have high risks in the business. Most of the banks are not interested in giving them loans to these small scale farmers. Without the loans, they are not able to expand their business. In addition, they have very limited information resources. It means that if there is a problem like large scale of pig disease in 2007, they will lose their capital and out of the business. The small farmer has the disadvantage when the pork price drops down. Because of small-size, they are not able to get enough benefit. These result in high production cost; however, this does not mean there will be a good return.

The small-size pig farmers benefit less than other bigger types of pig farmers. Being a small-size farmer, they do not have enough money to buy the equipments. More often, their feed cost is higher than big scale of farmers'. Cost and benefit will directly influence the enthusiasm of the pig farmers. It is also an important constraint for the development of pig production. In general, the feed cost can account for 65% -75 % of the total production cost. In Beijing, the major feed is corn. As a result, the price of corn plays a major role here. And piglets, labor costs, epidemic prevention, feed and management all contribute to the total cost of pig production. The difference between sale price and product cost constitutes is the benefit. The more benefits, the higher the pork production and quality.

5) Environment

However, because of rapid development of the pig farming industry in Beijing, the pollution is very serious. The environmental protection is a big potential abstract for pig farming industry. Dumping pig manure directly into the river has bad impact on the rural living environment. For large pig farmers, they already use manure to make marsh gas.

4.1.1.2 Management control system among farmers

Most of the traditional pig farmers use their eyes and their experience to check the quality of the meat and to control the safety; they do not have any knowledge of quality control systems, like HACCP. The majority of the farmers think that quality is not most important for them, because the slaughterhouse use HACCP control system. The cooperative and large scale of pig farmers uses HACCP quality control system.

i. Feed

The large-scale pig farmers themselves blend the feeds produced by the factory. They can buy the equipment to process the feeds. In this way, the quality and security are ensured. The small-scale pig farmers do not want to buy all the feeds from the feed factory, because they are more expensive than these blended by farmers. Farmers use the feeds in a mixed way. For example, they might use the feeds produced from factories for half a month, and then use the feeds blended by themselves for rest half a month. Most of the small-scale pig farmers live in the outskirts of Beijing city and also practice farming during the summer time. And they always use corn that grown by them as feeds. The quality of the corn can not be ensured and they do not have enough money to buy the equipment to process the feeds. Usually they thresh the maize kernels and break the soybean meal and then mix them together. Therefore, the quality and the security of the feed can not be ensured for these small-scale pig farmers.

ii. Environment of pig farms

According to HACCP (pig), the pig farm should be islanded from living hood (at least 1 km), control the sanitation of the pig farm and so on. All the large-scale pig farmers and more than sixty six percentage (66%) of middle-scale pig farmers are possible to meet these requirements. However, the small-scale of pig farmers build pig farms near their homes. The small-scale of pig farmers do not own enough money to buy all the necessary equipments.

iii. Immunization

According to the research conducted for the pig farmers, all pig farmers attached great importance to the quarantine inspection. They understand that if there is

epidemic on their farms, they will lose a lot of money or even lose all the income.

iv. Sanitation



The large-scale pig farmers can follow the so-called critical control point. But, the small-scale pig farmers can not. First, for these farmers, pig farming is only one part of the jobs they do. They have to do other works. Second, they do not want to increase their cost to buy the equipment and uniform. Third, they do not have enough condition for sanitation and disinfection. Picture 3 shows us one of the small-scale pig farmers in Beijing. There is no uniform and lack disinfection equipment here.

Picture 3: One of small-scale pig farmers in Beijing

v. Use of veterinary drugs

The small-scale pig farmers purchase the drugs from informal company and they do not keep any records. They always try to use their brains and experiences to control the drug. The middle- and large-scale pig farmers can control the quality of veterinary drugs very well. Twenty nine (29%) of large-scale pig farmers even hire expert workers to do this job.

4.1.1.3 Interventions to Encourage Small Scale Farmer Production

The research question: a number of the small scale farmers during the survey gave suggestions to improve the value chain and below is a summary of their responses.

According to the research with sixteen (16) of small scale of pig farmers, there are several main methods to intervention and encourage the small scale of pig farmers (table 10). All of them are agree with that: share the insurance between pig farmers and government and implementation the pig rearing subsidies for every farmer. More than ninety (90%) farmers hope to increase support for funding, and around 80% of farmers want to prevent and control the disease. All of them can help the small scale of pig farmers are safer and decrease the risks.

Table 10: Intervention methods for pig farmers

No	Intervention Method	No. of Famers
1	Insurance	16
2	Disease prevention and control	13
3	Implementation of pig rearing subsidies for every farmer	16
4	Increase support for funding	15

4.1.2 Brokers

By interviewing three (3) brokers, the author found that the broker is consisting of three levels. The functions of the different level brokers are: The first level of brokers is assigned agreement with slaughterhouse; the second level is to purchase the pigs from farmers and provide them to slaughterhouses; and the last level of brokers is providing related information to second-level brokers. The profit of brokers comes from the different prices between the purchasing price from pig farmers and sales price to the slaughterhouses. Their main functions in the chain are distributing the pigs from farmers to slaughterhouse.

The first-level brokers have direct link to slaughterhouse, but they need help from the second-level brokers who can supply pigs. Second-level brokers do not directly sign contracts with slaughters, but they can use the name of first-level brokers to supply pigs for slaughters. Therefore, second-levels of brokers are responsible to transport pigs to slaughters directly, and they are the crucial linkage within broker group. They work busily everyday between pig farmers and slaughterhouses. Third-level brokers are responsible to provide clues to the second-level brokers and earn commission fees. Their responsibility is to find farmers who want to sell pigs.

The price of pig is judged by the quality. Then, the pigs are divided into different batches for weighing and slaughtering. In slaughterhouse, records are made including the names of second-level and first-level brokers, also the supply amount (pigs). Because slaughters only pay the money to the first-level brokers, the second-level brokers have to obey the first-level brokers. At the same time, the first-level brokers could not buy the pigs from every farmer and sell them to the slaughterhouses. With the second-level broker, but the first level broker can received period bonus from slaughterhouses.

The profits of second-level brokers depend on price difference between the purchasing price (from pig farmers) and the selling price (to the slaughterhouses). But they also bear a lot of risks and costs. The major risks are dead pigs, weight loss and so on. The main costs for second's level of brokers are including: transporter, gasoline, quarantine and labor's cost. There are no costs for both first and third level of brokers. Finally, the second-level brokers will offer rather lower purchase price to pig farmers in order to reduce their own risk and cost. The government did not get the enough policy in brokers' position.

The main problems of broker are: there are too many levels of brokers; and there is no quality control when selling the pigs to slaughterhouse. The disinfect trucks are not good enough. The relationship between farmers and brokers is not good, but the relationship is good between brokers and slaughterhouses. The brokers want to cooperate with the farmers, but farmers prefer to cooperate with slaughterhouses directly. The detail costs and benefits are in 4.3.

4.1.3 Slaughterhouses

Over the period 1999-2006, the number of pig slaughterhouses in Beijing has declined by over ninety percent (90%) from 220 to 14. It has been ascertained that there are ten (10) public and four (4) private slaughterhouses in Beijing City.

In 1999, Beijing Municipal Development Committee issued a plan: “Beijing Municipal Development Plan for Pig Slaughtering Industry”. Small slaughterhouses would gradually be dismantled and large modern slaughterhouses would be built. All of the small slaughterhouse which can not meet the required standard must be closed down by the end of 2006. Some new slaughterhouses would be set up in regions far away from the urban area. All of fourteen (14) slaughterhouses will have passed HACCP quality system before the 2008 Olympic Games. The daily production capacity of the total fourteen slaughterhouses is 25,000 pigs. And now the market demand for Beijing is around 14,000 pigs every day. This means that the average utilization rate is around 55%. If they can increase this utilization, they would achieve a good profit with high efficiency.

All slaughterhouses have a good quality system in Beijing; they have their own farms (large-scale), integrity's slaughter workshop, transportation equipment and meat retail shop. They are monitoring the whole process from farmers to sell products to consumer. As the table shows below, according to the three interviews with slaughterhouses, there are two main characteristics in slaughterhouse. Firstly, all of the slaughterhouses use operational HACCP quality system; secondly, more than 1000 pigs can be slaughtered per day in all of 3 slaughterhouses. The slaughterhouses benefit from government support policies. For example: the slaughterhouse can get loans and subsidies from bank, and decreased taxes.

4.1.3.1 Quality Control in the Slaughterhouse

According to the visits to slaughterhouse and an interview conducted with staff from Ministry of Agriculture, all the slaughterhouses in Beijing have detection equipments. Since 2000, Beijing Municipal Government has paid special attention to the management of slaughterhouses. Many slaughterhouses which can not meet the standards have been shut down to standardize the slaughtering market.

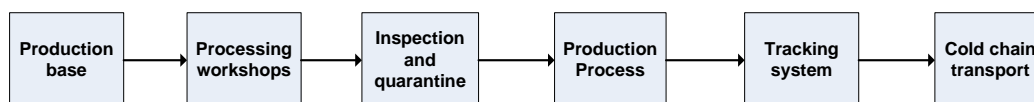


Figure 2: The main chart in slaughterhouses

i. Production base

The slaughterhouse owned their breeding base, (located in Beijing, Hebei, Liaoning and other provinces, such as Hebei Minghui culture group, Changbaishan pig farms), signed agreement with farmers to purchase pig, the amount of livestock to around four million pigs per year. All sources of live pigs are from non-infected areas and in strict accordance with the quarantine by the first quarantine.

ii. Inspection and quarantine

In order to ensure the high quality of pork production, the slaughterhouses use quarantine procedures to control the quality of pigs, so that each pig can be sold safely. The table 11 talks about the main quarantine procedures to control the quality of pigs in slaughterhouse. It is separated into five parts: skin, bowels, trichinosis, bit muscle, body and other quarantine procedures.

Table 11: Quarantine procedures to control the quality of pigs

Head	Head lymph node quarantine
Skin	Surface quarantine
Bowels	Mesenteric lymph nodes, spleen, stomach lymph nodes, lung lymph nodes, heart, liver doors lymph nodes.
Trichinosis	Diaphragm muscle
Bit muscle	Bit muscle
Body	inguinal lymph nodes, groin deep lymph nodes, haunch, inside of muscle
Others	Quarantine before slaughter, quarantine repeat, thyroid and adrenal

4.1.4 Pork wholesalers in Beijing

In Beijing, all of the wholesale markets not only sell pork products, but also sell other products, such as: beef, chicken, vegetables, and fruits. But all of them have special counters and section for pork. In the wholesale market, wholesaler usually sells the whole pigs to the retailers. There are altogether twenty four (24) wholesale markets in Beijing. By interviewing two (2) wholesaler markets, the main role of the wholesaler market is purchasing pork from slaughterhouse and selling to the supermarket or open market. There are more than 15 local or other areas brand (the name of slaughterhouse) in Beijing wholesaler market.

The role of wholesaler market is that buy the pork production from slaughterhouse by a large of amount (more than 500 per pig/day) and sell pork to retailer by a middle or small amount (1-100 per pig/day). The drawback is that the middle and small-scale of wholesaler market are not good at controlling the quality of pork (table 12). Shortages are short of the quarantine equipments, facilities are not good enough (i.e. the temperature is not cool enough in retailing place). And the level of workers in market

needs to be improved. The wholesaler market uses the air condition to control the quality of pork during the pork enter the wholesaler market. That is the only quality control in wholesaler market. The main problems are poor support policy from government, lack of the equipment for quarantine and disinfection, especially in the small scale of the wholesaler market. The detail costs and benefits are described in sub-chapter 4.3.

Table 12: The drawback in wholesaler market

No	Wholesaler market	No. of supermarket
1	Insufficient control the quality of pork	1
2	Lack of the quarantine equipments	2
3	Retailing facilities is not good enough	1

At the big scale of wholesalers market, the pork water containing percentage, clenbuterol, and drugs pork can be tested by special staff compared to the sample since there is complete quality detection technical equipment. The study revealed that there is a agreement between wholesalers and the slaughterhouse, the unqualified pork can be returned to slaughterhouse if the pork cannot meet the requirements of quality according to test from wholesaling market. The small scale of wholesale market can not get as high as others, hence, the quality can not be reached on the high level. On the base of the data derived by author, the cost of detection devices is considerable high, and the monitor and working environment should be paid attention, and to form much more high level of management.

The figure 3 and 4 can explain how is working quarantine and management in wholesaler market. Figure 3 shows the quarantine process from pork enter the wholesaler market, and check quarantine inspection certificate, agreement from slaughterhouse, and quarantine at wholesaler market. Figure 4 shows the management map in wholesaler market. It is divided into three channels that include local live pigs, other areas pigs and other areas slaughterhouse.

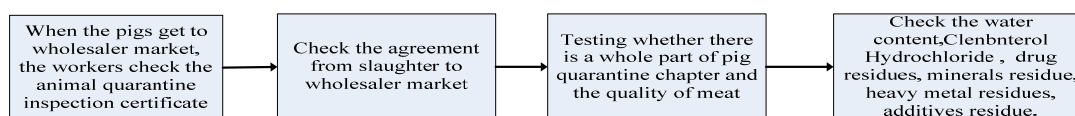


Figure 3: Quarantine sketch map in wholesaler market

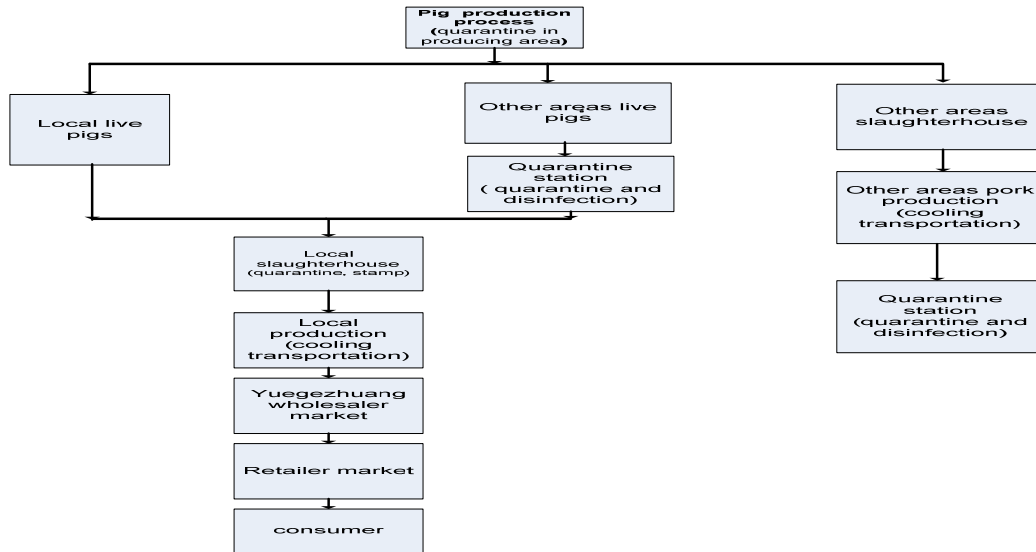


Figure 4: Management sketch map in wholesaler market

The small-scale wholesaler market has the working flow chart as well (see figure 5), and it is poorer compare with big scale of wholesaler market. The staff and equipments of small wholesaler market are not so competent enough. In figure 3, the wholesaler market is checking the water content, drug residue and so on. But the small scale of wholesaler market, there is no quality check.

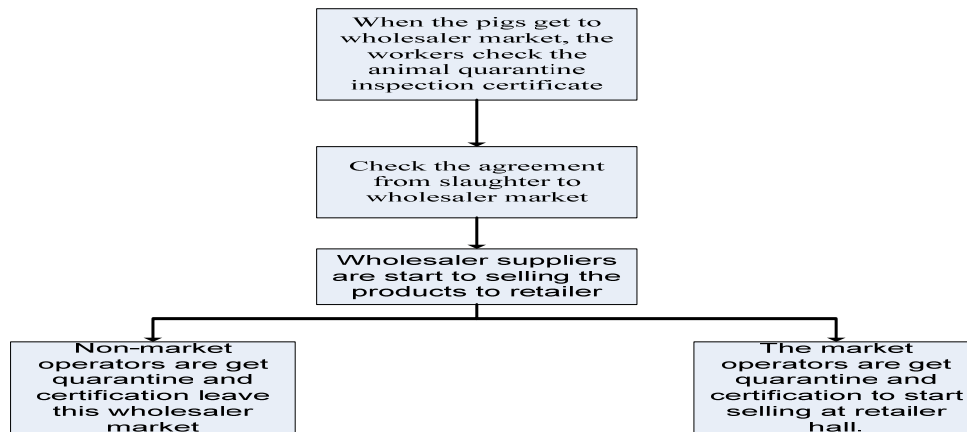


Figure 5: The sketch map in wholesaler market

4.1.5 Pork retailers in Beijing

The interview are carried out on 5 (three supermarkets and two open market) of the retailers. There are three main pork retailing channels in Beijing: open markets, supermarkets and meat shops. The first two contain the main selling condition in Beijing; there are a few meat shops nearby the slaughterhouse. The supermarket mainly sells the well-know brand (name of slaughterhouse), so it has the ability of ensure the product quality as much as possible. The big-scale super market

(Carrefour) owns the cooling trucks equipment, fresh storage devices and other technical detection system. This can ensure the high of quality, as you can read the production date, place and related production information on the package. The retail costs and benefits are in 4.3.

The large supermarkets (such as Carrefour) purchase pork from slaughterhouses. The slaughterhouses have a good quality control system. The pork price of the large supermarkets is higher than that on the open market (for example: Shuitun open market). The wholesalers at open market have to purchase pork from the wholesaler markets because the amount is not enough for them to transport pork from slaughterhouse that result extra cost for cool transportation. In this way, these kinds of wholesalers reduce their transportation cost. There is a lack of quality control between the wholesaler and the open market.

The problem for supermarkets is overcharged by lots of fees. These charges include: the entrance fee, promotions management fee, health management fee, commodity inspection fee and marketing personnel fee. Sometimes, the payment has to be delayed for a long time, leading to unfair competition, which is harmful for the healthy development of meat production and the food security of the consumers.

The major problem of open market is the bad sanitation in Beijing. There is no antiseptic process for the working staff and working environment and the temperature is high in the market. The reasons are summarized as following: firstly, the management staff is not competent to carry out related management and monitoring process; secondly, retailers can not give the food safety and clean environment on the privilege condition, such activity aims to reduce the expenditure and gain the max profit.

In opposite, the condition in supermarket is better than in the open market. However, the price is much higher and there is too much added value for the retailers. For instance, the high renting cost, advertisement cost, and taxes. Also, the application for sales right in the markets is complicated. All of these can be abstracts for the retailers to join the supermarkets any way.

The table thirteen (13) is shows the characteristics supermarket in Beijing, that is the main characteristics in all of three interview supermarket.

Table 13: The characteristics in supermarket

No	Supermarket	No. of supermarket
1	purchasing pork from slaughterhouses	3
2	good quality control system	3
3	price is higher than open market	3

The open market mainly sells the unknown products, and the open market is working in the outdoors. Their main costs are tax, electricity and the labor salary. The management system of the open market and the utilization rate is rather poor. According to two interviews in open market, there is a bad quality control system; they use icebox and water to control the quality and keep the pork fresh. If the temperature is too high, some parts of pork will be kept in the icebox for a few hours or they usually spray water on the pork every hour to keep them fresh. The table fourteen (14) is shows the characteristics in open market.

Table 14: The characteristics in open market

No	Open market	No. of supermarket
1	bad quality of sanitation	2
2	no antiseptis process for the working staff and working environment	2
3	high temperature in the market	2

4.1.5.1 Quality Control by the retailer

The supermarkets have an operation area for storing pork and the sanitation is in good condition. But the facility of the open markets is not good enough. The processing tools can not meet the required disinfection standard. In Beijing, the open markets are out door and the price here is cheaper than supermarket. The shoppers want to decrease the cost as possible as they can. And the temperature of refrigerator is not cold enough in open market. When retailers in the open market can not sell out the pork in time, the quality of pork will get worse.



Picture 4: One of supermarket and open market in Beijing

4.1.6 Consumers

From the interviews with thirteen (13) consumers, the consumers have many methods

to access pork quality problems (magazines, TV program, friends' introduction, internet, etc.). However, it is still not quite convenient, because of lacking possibilities of gaining information. Consumers do not want to spend too much time and energy on this. This phenomenon reflects that two significant problems which have affected the quality information of pork in Beijing: one is the lack of the supply of pork market information, and the other is that there is not a standard system about the pork quality information.

According to the interviews with 13 consumers (table 15), seventy seven percentage (77%) of consumer who are thinking the quality of the pork is nor so good at this moment. The table below is shows the results.

Table 15: Pork's quality in consumer

Retailer	Pork' quality is good	Pork' quality is not good
Supermarket	1	4
Open market	2	6
Total	3	10

Nine (9) of thirteen (13) consumers who chose the high quality of the pork just depend on their judgment/experience about the freshness. The freshness is considered as the most important quality signal. Meanwhile, other characterizes of pork such as nutrition and quality condition is quite hard to judge. Therefore, many consumers access to the pork quality information as main reference during purchasing process. However, not all the consumers judge like this. Three (3) of thirteen (13) would rather trust their purchasing experiences than the pork quality information. And even one (1) of thirteen (13) considers that high price means high quality. Table 16 shows the critical point for consumer to choose the pork.

Table 16: The point for consumer choose pork

No	The point for consumer choose pork	No. of Consumers
1	level of the fresh of pork	9
2	purchasing experiences	3
3	price	1

4.2 Chain Supporters and Influencers the Pork Industrial Value Chain

There are six main official departments to support pig /pork industry value chain in Beijing, which organize and manage the pig production. Their functions are controlling and developing the pork industry. To some extent, they are beneficial to organize all actors to solve problems together. However, those departments of government have two major drawbacks: one is insufficient policies on implementing the quality system; another is less efficiency and cooperation among these departments. There are two cooperative unions in Beijing, which provide the market information to their members.

Table 17: Main functions of six official department in Beijing and their related certification.

Department	Main function	related certification
Revenue department of Beijing	Collect the tax	
Business administration of Beijing	Control the distribution of pork.	Business license
Health bureau of Beijing	Responsible for the quality of pork	Health permits
Department of control price in Beijing	Control the price of pork industry	
Quarantine department of Beijing	Responsible for the quality of the product	Supervision and random checks
Livestock department of Beijing agricultural Bureau	Control and management pig and pork production	

These departments (table 17) include: Ministry of agricultural, Ministry of Public Health, revenue department of Beijing, Beijing Quarantine Bureau, Beijing Business Administration Bureau, and Beijing quarantine department. All these departments are responsible in supervising the links with pork production industry in Beijing. They do not consider the legal authority of departments at the country level and at the district level. Too many departments of government are responsible for the policy making. But the coordination is very poor.

The main result is a description of involved actors within the pork industry chain in Beijing, which is presented in the following figure 5. It is based on the findings of the field, which is obtained from survey (focus on pig farmers) and interviews (among brokers, managers of slaughterhouses, wholesaler markets, open and supermarkets).

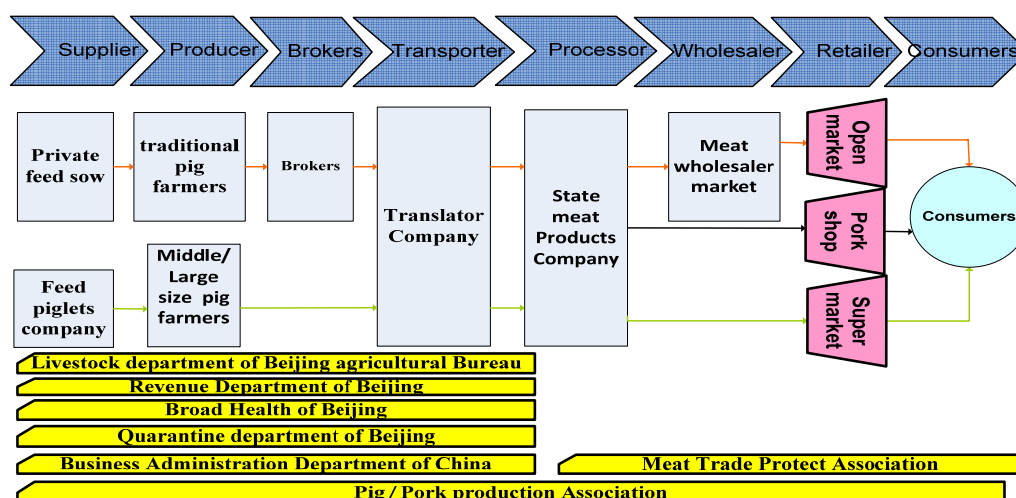


Figure 6: The Beijing pig/pork industrial value chain

Figure 6 illustrates the pig value chain in Beijing from supplier to consumer. It reveals the different types of actors and how the chains are organized. The pig/pork industrial chain in Beijing is spit up into two sub-chains. The orange arrows indicate the small scales farmers' chain and the green arrows indicate the large scales farmers' chain. The orange arrow is the main distribution chain in Beijing. It also shows the chain supporters and influencers (indicated in yellow blocks), which include government organizations, cooperation's departments and associations. These departments and associations play an important role as the chain supporters in assisting the whole chain.

4.3 Distribution of the Margins among the Different Actors

According to the information revealed by the research in table below, it was noted that the pork value chain in Beijing involved the farmer, broker, transporter, slaughterhouse, wholesaler and retailer. It is showed that the slaughterhouse and retailer shared the largest gross margin in the entire value. The broker, transporter and wholesaler market were revealed to have the lowest amount of value. It is consistent with the results of those interviews carried out with traders, which is revealed that the retailers were influential deeply on the governance of the pig/pork industrial chains. The brokers would face a big challenge during the developing of the pig industrial chain. Table 18 shows the benefits and rate for different actors in Beijing pork industrial chain.

Table 18: Benefits and rate are in Beijing pork industrial chain.

Industry links	Benefits (Yuan/one pig)	Rate of total benefits (%)
Traditional farmers	39	18.1%
First level of brokers	5	2.0%
Second level of brokers	16	6.4%
Third level of brokers	6	2.4%
Transporter	5	2.0%
Slaughterhouse	85.5	34.3%
Wholesaler market (Agent)	12.5	5.0%
Retailer	74	29.8%
Total	249	100

4.3.1 Pig farmers

The cycle of breeding pig is approximate five and half months. One pig needs about 1.3 kg feeds per day. The average price of feed given by feed company is 5.5 RMB /kg in Beijing. So the total feed cost 1180RMB/pig. The fee for the vaccine is 50 RMB /pig, and the purchase price of piglet is 160 RMB/pig. The sanitation cost for maintaining a pig is 36 RMB /pig. The average weight of the pig is around 100 kg in Beijing. The selling price is around 14.65 RMB /Kg. Therefore, the profit of each pig is 39 RMB (see table 18).

4.3.2 Brokers

The first-level brokers have no cost. They are able to sign supply agreements with slaughterhouses. The benefit of the first-level brokers depends upon the number of the pigs. Normally, they can earn 5 RMB/pig from slaughterhouse. The main cost of the second-level brokers comes from quarantine, disinfection and transportation. Quarantine cost 5 RMB per pig; disinfection cost 2 RMB per pig; and cleaning cost 2 RMB per pig after being unloaded at the slaughterhouse. The lose weight of one pig usually around 4 kg during transportation. In addition, the price of gasoline is 5 RMB per pig and the cost for renting a truck is 15 RMB per pig. Therefore, it costs 35 RMB per pig in total ($5+2+2+5+5+15+6=35$). According to my research, the slaughterhouse can offer 1516 RMB per pig, i.e., Dahongmen slaughterhouse. Then the benefit of the second-level brokers is 16 RMB per pig. The benefit of the third-level brokers is the commission paid by the second-level brokers. They usually can get 6 RMB profit per pig from second-level brokers, if the transaction succeeds (see table 18).

4.3.3 Slaughterhouse

According to the data from Dahongmen Meat Food Products Co., Ltd collected on August, 4th, the example is a pig of 96Kg. The purchasing price for each pig is 15.80 RMB/kg ($15.8*96=1516.8$). And the price sold by slaughtering is 18.4 RMB/kg. ($75\text{kg}, 18.4*75=1380$) The price of by-products (hoofs, blood, heads and offal) is 260 RMB per pig. So the profit for the slaughterhouse is 124RMB/pig. In Dahongmen slaughterhouse, there are 100 workers and the salary is 80 RMB per day. The cost for equipment depreciation and maintenance is 25,000 RMB/day and the cost for water and electricity is 500 RMB/day. Then it totally costs 33,500 RMB/day. In Dahongmen Slaughterhouse Company, the average slaughtering capacity is 1000 pigs per day and the cost for every pig is 33.5 RMB. The quarantine fee is 5 RMB per pig. So the net profit is 85.5 RMB ($85.5 = 124 - 33.5 - 5$). (See table 18)

4.3.4 Wholesale market and agent

The benefit for the wholesale market is mainly linked with the total number of the pigs. Every slaughterhouse has an agent in the wholesale market, and this agent must pay 5 RMB per pig to the wholesale market. For example, the transaction amount of Yuegezhuang wholesale market is more than 1,000 pigs every day. So, the total profit is not very low. The agents mainly earn money through the difference between prices. Take the situation happened on August, 4th of 2008, the price is 18.4 RMB /kg at Dahongmen slaughterhouse and the price at the Yuegezhuang wholesaler market is 18.7 RMB / kg. The average profits is $(18.7-18.4)*75=22.5$ RMB / pig. The agents still have to pay money to the slaughterhouse for transportation, disinfection and gasoline. So it will costs 10 RMB per pig. Therefore the profit of the agent can earn 7.5 ($22.5-5-10=7.5$) RMB per pig (see table 18).

4.3.5 Supermarket and open market

Small supermarkets and large supermarkets have different purchasing channels, like open markets and small supermarket purchase pork from the agents of the wholesale markets. According to the data collected from ChaoShifa supermarket on August 7th, the purchasing price is 18.7 RMB/kg ($18.7 \times 75 = 1402.5$ RMB/pig). The income is 1530 (20.4×75) RMB/pig. The tax is around 3.5 RMB/pig and the money to rent the stall is around 35 RMB/pig, and the gasoline is 15 RMB per pig from wholesaler market to supermarket. Therefore, the profit is 74 RMB/pig. In the research of Shui Tun retailer and wholesaler market, the purchasing price is also 18.7 RMB/kg. The selling price is 1485 (19.9×75) RMB per pig. The tax is same to supermarket and the stall is 5 RMB per pig. Besides the gasoline is 8 RMB per pig. Therefore, the profit is 74 RMB/pig in open market (see table 18).

4.4 Quality Control with the Value Chain

4.4.1 The main problems for quality control

i. Quality standard levels

Pork quality standard in developed countries are enacted by special state legislature institutions. There is only one standard, very clear and conducive for the implementation process. In Beijing, the pork quality standards can be divided into there types: national standard, the Beijing Municipal standard and the enterprise standard. The testing methods are not unified, particularly for the pork processing and distribution. There are no unified standards and no unified legal regulations.

ii. The level of testing equipments needs to be elevated.

The pork-product quality testing process of Beijing starts quite late, with low testing technology and outdated equipment. There are not enough professional working staff and the testing items are not comprehensive enough. There are three-level testing system, i.e., the municipal level, the district level and the enterprise level. The testing equipments are not advanced enough. The simple testing equipments (for example, these to test the water content) can not ensure the quality of the testing result.

iii. HACCP management system

Currently, food security is the major problem of pork production in Beijing. For example: traditional pig farmers can not guarantee the quality of the breeding process; the content of clenbuterol and food additives exceeds the required standard. Only the slaughterhouse can guarantee the quality and safety of pork products.

CHAPTER 5 DISCUSSION

5.1 SWOT analysis of pork value chain in Beijing

Strengths:

- Large pork production and consumption amount
- Relative lower price among meat groups
(The price of pork is around 19.9 RMB per Kilogram, the price of beef cost 23.1RMB per Kilogram, while the price of mutton is around 26.9RMB, the prices of chicken and fish are around 20.5RMB and 21.1RMB per Kilogram respectively).
- Relative shorter logistics arrangement within the Beijing pork chain
The study revealed that the Beijing pork market could self-sufficient. Most of the pork was supplied by the 14 local slaughterhouses that also purchased pigs from privately-owned hoggeries and different local pig farmers in Beijing area.
- The government is eager to support this industry.

Opportunities:

- Consumers' preference of pork consumption as compared to other meat sources
- The chance of combining the small-scale farmers into big producers/associations.
- Development of an office to facilitate the marketing information
- Adaptation to cool chain management of Beijing pork chain
- Large and increasing demand of pork because of rapid development of the living standards of the Chinese people

Weaknesses:

- Fluctuation of pork price and vicious circle
Recent years, the prices of pork in Beijing (even in whole China) have fluctuated dramatically. Formerly, farmers regarded raising pig as a kind of supplementary or extra farming income. When the price of pork became higher, farmers are anxious to raise pigs which led to lower prices due to oversupply. While in the next year the price of pork became higher again because of the shortage of supply resulted from the decrease of farmers' raising pigs. This formed a vicious circle and it happened again and again in China that has quenched the farmers' enthusiasm of raising pigs heavily.
- Insufficient government coordination
- Nonexistence of quality control management in small pig farmer groups directly affected the selling price
- Lack of marketing information in terms of demand and supply price among small farmers
- Small farmers do not have stable marketing channels
- Small scale pig business directly affected selling channels and profit
- Lack of financial support

Threats

- Customer taste changes
- Strong competition in pork production
- A lot of substitute products, such as: beef, chicken, mutton and egg.
- Market risks
- Environmental influence of surroundings.

5.2 Different margin shares among the actors of the chain

As it shows in table 18, slaughterhouses and retailers obtained much more margin shares as compared to the other actors of the pork chain in Beijing, accounting for 34.3% and 29.8% respectively.

Slaughterhouses convert pigs into pork, which is edible for consumers. They invest a lot of fund in plants, equipments and application of technology, which usually produce higher added value than simple livestock farming. Retailers rank the second in the gaining of margin share in the pork chain. They become more important with the increasing development of supermarkets, the final outlets of the products. Meanwhile, retailers always have many supply channels.

Another noticeable issue is that, there are too many brokers in different levels, buying and selling in the pork chain. Their benefit totally accounts for about around 10.8% of the margin share, which is two times more than that of the wholesalers. It is possible to cancel at least two levels of brokers from the chain. This could increase the gains of the farmers and the remaining brokers, especially the second level brokers, because they are organized, collecting pigs from the farmers and transporting them directly to the slaughterhouse. And the small farmers could combine together and supply pigs directly to the slaughterhouse.

Results 4.1.1 and table 7 also show the different levels of benefit among three types of pig farmers due to different feeding cost. Contract farmers got the leading benefit of 0.81 RMB/kg, followed by cooperative farmers whose benefit was 0.74 RMB/kg, while the small-scale farmers gained only 0.39 RMB/kg, less than half of that of the contract farmers. The study revealed that feed cost has played a vital role here. Small-scale farmers paid the highest cost for feeds, contract farmers paid the lowest while the cost of the cooperative farmers was intermediate.

The underlying reason is that the small-scale farmers used only corn and other grains produced from their own farms to feed their pigs; they could not afford concentrate feed because of the high purchasing price. Moreover, they did not follow the scientific raising methods, which feed pigs according to the different growing stages. Furthermore, the brokers took a part of benefits from the small-scale farmers. All these led to higher costs and lesser gains for the small-scale pig farmers make as compared with the other two types of pig farmers. To the small-scale farmers, pigs

raising is only a supplementary framework, one way to utilize what is left over from their harvest. They are not willing to invest more input, and their pigs are not as healthy and fat as those of the other types of farmers. When the selling price is not stable and unpredictable, their income would become even lesser.

The situations of contract farmers and cooperative farmers are different. They have stable marketing channels either by contract with slaughterhouse or by stable supply of pigs. They are willing to invest in purchasing piglets, equipments and good concentrated feeds, etc. As a result, they get much more income because of higher gross weight per pig and larger amount of production, leading to lesser cost for each pig.

5.3 Different quality control implementation among the chain actors

The shortcoming of most of the actors of the Beijing value chain was lack of a good quality standard system, both in certification and in implementation. Besides the slaughterhouse, many actors did not recognize the importance of the HACCP certification system. In order to save expenditure, they usually did not pay enough attention to problems of quality and safety. The traditional pig farmers did not know the importance of food safety, and none of them used any quality system to control the safety/health of their pigs. The only methods they used came from their experiences and observations. The large-scale and cooperative pig farmers, however, did use the HACCP system.

It was noticed that the best implementation of quality control was undertaken at the slaughterhouse stage when the comprehensive quality control plan and strict inspection management were established. All of the Beijing slaughterhouse enterprises used the HACCP quality control systems from the time when the pigs were received into the slaughterhouse until they were processed for sale. But some of wholesale markets and open markets did not follow this quality system, the temperatures were usually higher than required. Although there did exist quarantine and examination procedures, the level of quarantine equipments were yet to be improved. Because of high costs, their uses were quite limited.

5.4 Comparison of coordination between the Beijing pork chain and the Netherlands pork chain

There are both similarity and difference between the functional administration and systematic coordination of the pork industry in the Netherlands and that of the Beijing Municipality.

The similarity is that both entities (the Netherlands and the Beijing Municipality) have organizations managing and monitoring the works of their respective pig industries. But the implementation of their administration is different. In the Netherlands, the pork

industry was monitored by only one organization, i.e., the Ministry of Agriculture, Nature and Food Quality, with comparatively higher efficiency. But in the Beijing Municipality, it was monitored by a group of administrative organizations, each of them worked independently. Besides the main administrative organization, the Livestock Department under the Beijing Municipal Bureau of Agriculture, there are also many other government organizations such as the Beijing Bureau of Quarantine, Beijing Municipal Health Bureau, the Revenue Department of Beijing, the Department of Price Control and the Beijing Administration for Business. All of these organizations have some say over the pig industry. And this may inevitably lead to confusion caused by vaguely shared responsibility, overlapping, duplicate, even conflicting requirements and regulations, loopholes and low efficiency. It is high time to establish a new organization with combined functions of all of the above-mentioned.

In Beijing, there is a Beijing Pork Production Association that works as a branch organization under the Beijing Animal Agriculture Association, whose role is somewhat similar to the Product Board for Livestock, Meat and Eggs (PVE) of the Netherlands. But, the Beijing Pork Production Association (BPPA) represents only several large pigs raising farms, piglet companies and feeding companies. It does not include slaughterhouse, wholesalers and retailers within the pork value chain. As a result, the BPPA cannot represent the interests and wishes of all the actors of the pork chain. The BPPA was established in 2000, the moment when the pork industry in Beijing was still at the developing stage and there were many things yet to be improved. In contrast, the PVE had had much more experience in this field for decades. And the BPPA doesn't function as well as PVE in Netherlands in terms of fund collecting (or access to loans) and operational activities. Two major differences are indicated as follows:

- Firstly, the BPPA had no income except entrance fees. The PVE could collect taxes and fees on behalf of the government for joint management activities, requested by the government. But the BPPA could not do so.
- Secondly, the function of the BPPA involved mainly three kinds of activities, including drawing up regulations, offering common training programs and providing information on breeding rules to the pig farmers. The PVE undertook much more activities than the BPPA. In addition to the above-mentioned activities, it was also concerned about social affairs such as the labor market, the monitoring of employment, the development of labor market projects and the promotion of employee participation.

5.5 Interventions to Encourage Small-Scale Farmer Production

1. Insurance

The government and the farmers should share the cost of pig insurance together. This will help the farmers alleviate economic losses caused by pig diseases.

2. Disease prevention and control

Farmers should be aware of why they should know how to prevent and control pig diseases. The disease control practices should be started from feed production until the time when the pigs are sold. The government should also make laws for the implementation of vaccination.

3. Implementation of pig rearing subsidies for farmer

The government should increase pig rearing subsidies to the pig farmers, especially the small-scale farmers. If they could get sufficient rearing subsidies, they would improve the quality and production of their pigs.

4. Increase support for funding

Agricultural banks and other financial institutions related to the development of the pig farming industry should consider financial support as their priority and increase the amount of micro-credit/loans to the small-scale pig farmers. Farmers who want to increase production or pig quality but are short of money, could get funds/loans from these banks. This will help the development of pig industry in Beijing.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The main chain actors are: pig farmers, brokers, transporters, slaughterhouses, wholesalers and retailers. Pig farmers are responsible to feed pigs, playing the role of producers in the value chain. The major roles of the brokers are to purchase pigs from pig farmers, and sell them to slaughterhouses. Transporters are the intermediate coordinators who are responsible to transport pigs from pig farmers to slaughterhouses. The role of slaughterhouse is to slaughter pigs, with pork products as its output. Quality control system is mainly implemented at this stage. Wholesaler markets provide large amount of pork products to retailers. As the last actor of the entire chain, consumers buy a little amount of pork products from the retailer markets.

This chain has been supported and monitored by several organizations, including the Pork Production and Meat Trade Association, Revenue Department of Beijing, Beijing Administration for Business, Health Department of Beijing, Beijing Bureau of Quarantine, and Department of Price Control. All these organizations are responsible to organize, manage and develop the pork production industry. However, they independently play different roles in supporting the value chain. For example, the Beijing Administration for Business is in charge of the marketing, and the Health Department of Beijing is in charge of the sanitation.

As regard to the distribution of benefit share within the actors of the value chain, research indicated that the slaughterhouse and retailers earn higher benefit than all other actors. The slaughterhouse earned 34.3% of the benefits in total, while the pig farmers earned only 18.1%. The research also showed that large-scale pig farmers (they directly sign contracts with slaughterhouses) earn higher profit than small-scale pig farmers, because large-scale pig farmers can take advantages of scale economy and offer pigs of better quality. By contrast, the brokers, transporters and wholesaler markets can only gain less benefit, around 2% to 5%. There is no need to be surprised. The benefit has to be shared among the three different kinds of brokers. And the transporters just play minor roles in the process of pork production and marketing, with little cost and input. The benefit per unit earned by the wholesalers is also not very high, but the total benefit they obtain is quite high due to the large trading amount.

The research also indicates that the implementation situations of quality control are different among the actors of the pork value chain. For the small farmers, there is no quality control system. The HACCP system is only adopted by large-scale and cooperative pig farmers. It is noted that the best implementation of quality control took place at the slaughterhouse level, with comprehensive quality control plan and strict inspection regulations. All the slaughterhouse enterprises in Beijing have adopted HACCP quality control systems. This process starts from the pigs' entrance to the

slaughterhouse until the final sale. When the pork products were sold in the wholesaler market, many facilities were used, such as air conditioners, quarantine and disinfection equipments. Supermarkets have a higher reputation than the open markets in terms of pork freshness and storage condition. Open markets just use water and icebox to control the quality. Since the pork is easy to be contaminated in the open environment, it is difficult to follow strict quality control process. Since the wholesaler markets, supermarkets and open markers adopt different standards, quality control has become a major problem. The lack of qualified testing equipments and unified application of the HACCP quality system also contribute to the confusion.

There are several constraints negatively affecting the small-scale farmers in pork production. For example, they can not obtain the information on marketing in time, limiting their marketing channels and their adoption of the quality control system. In addition, they have to take higher business risk for less benefit. Environmental problem is also a big challenge for them.

At the end of the research, the author suggested that interventions from farmers into the value chain are possible. The local governments could make beneficial policies for the small-scale farmers to encourage their production, for example, by sharing the insurance fee for the pigs. Increasing the support for funding which will afford some money for small scale farmers during feeding pigs. In addition, the local governments could also give subsidies for each farmer who raises pigs. Meanwhile, small-scale farmers also need to learn more advanced knowledge and techniques on feeding, which is beneficial to prevent diseases of pigs.

In this paper, the whole value chain has been thoroughly evaluated. The first key chain actor is producer, mainly constituted by small-scale farmers. They play the key roles in the pork production of Beijing. However the benefit (around 18.1%) they get from the pork production is not as high as they have expected, because of high cost, lack of quality control system, and lack of marketing information. Another reason is that the benefit has been partly taken by the brokers. Furthermore, the government authority did not provide sufficient protection to pig farmers.

Brokers play the intermediate roles of information connectors. They share some profits (10.8%) from the pork value chain, which previously should belong to the pig farmers and the slaughterhouse. According to the strict government regulations, the slaughterhouse has been provided high-quality equipment to implement the quality control system. Meanwhile, it also obtains the highest benefit from the pork value chain. The benefit per unit earned by the wholesalers is not very high (5%). But the total benefit they obtain is quite high due to the large trading amount.

For the small-scale wholesalers, quality control is not perfect due to reasons like the market environment (e.g., temperature control) and unavailable equipments. Retailers in the open markets get quite high benefit (29.8%) from each pig. However, they also

face problems of lacking quality control system and surrounding environment. Therefore the high quality of pork can not be secured. The last actor of the chain is the consumers. Through this research, we can see that the consumers care mostly about the nutrition, safe quality of the pork, as well as the price of the pork. Due to reasons of limited time and not-careful-enough planning, some parts of the research are not perfect. However, the author thinks that the part about pig farmers is mostly important, and has been thoroughly and successfully analyzed.

6.2 Recommendations

6.2.1 The pork chain needed to be improved

The pig/pork production chain of Beijing Municipality has some features needed to be strengthened. The current production chain system (figure 6) is too crowded with too many actors. It could be easily integrated into a simpler level of the production chain without decreasing its functions. This change would also lead to increased efficiency of the production chain.

Firstly, the role of traditional pig farmers could be incorporated into the function of farmers' cooperatives. This could increase the supply capacity of the pig farmers so as to increase their bargaining power with purchasers. For example, they can sell the pigs to slaughterhouses and other logistic organizations. They can sign contracts with feed suppliers to purchase large amount of feed for one-time. They can share production management, disease control and market information with one another. Training course can be organized to improve the farmers' production performance. Therefore, it will improve competitive advantages, such as higher profit (through directly selling pigs to slaughterhouses with brokers), easier accesses to bank loans, better production environment, more strengthened position in the pork value chain, as well as better pork quality control.

Secondly, the role of brokers could be incorporated into the function of the farmers' cooperatives and the responsibility of slaughterhouses. Farmer could obtain more income by canceling the brokers' fee. Table 18 shows that the canceling of the brokers would free up to 10.8% of the gross benefit to either the slaughterhouse or the producers. These would shorten the length of the production chain and ensure that more benefits could be shared among the remaining actors, especially the pig farmers. (All the above-mentioned issues were considered in designing and proposing a new pig/ pork production chain system in Figure 7).

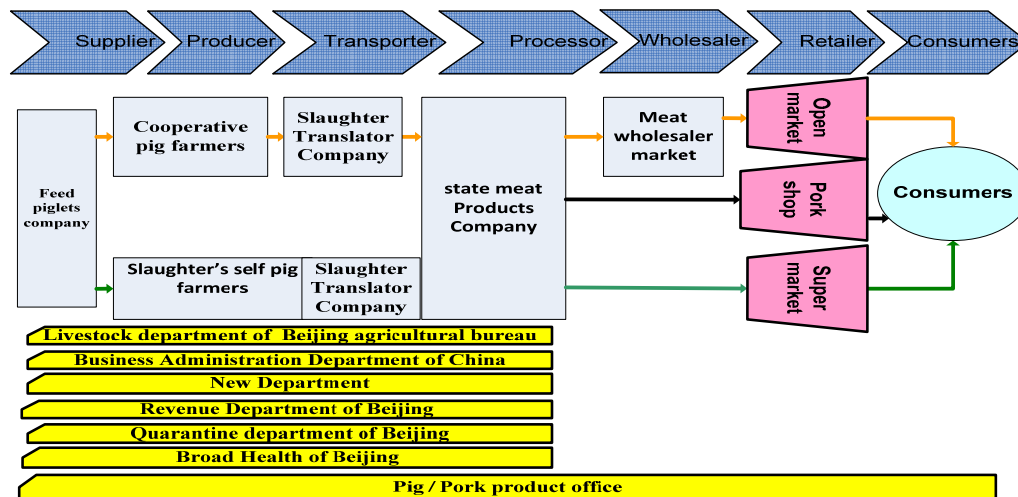


Figure 7: Proposed new pig/pork industrial Chain in Beijing

6.2.2 To clarify the functions of government departments

In the new value chain, the functions of related departments should be clarified. Otherwise, the slaughterhouse and the pig farmers might feel confused about the overlapping functions of different departments. Ideally, Beijing Municipal Health Bureau is only responsible for the operation of environmental issues, and hence not responsible for the quality control of the pork. But in reality, Beijing Municipal Health Bureau also gets involved in the management of quality control, for the sake of collecting more money from slaughterhouses. Sometimes, the slaughterhouse has to pay double fee on quality control, one for Beijing Municipal Health Bureau and one for Beijing Bureau of Quarantine.

The Beijing Municipal Government should thoroughly specify the regulations and establish unified criteria on the assessment of and supervision for the overall performance of all the organizations instead of setting different rules for each organization. By doing this, these organizations will improve their efficiency and offer stronger support to the pork production chain. It is also suggested to set up a new government office, which deals with all related supportive functions and provides unified service.

6.2.3 The founding of pork production association

A pork production association can be founded under the Beijing Municipal Government, which is responsible to monitor and manage the pork production process, from the feed production to the retailers. The municipal government can make related policies to support the pork production process, and to facilitate the full functions of the pork value chain.

In the past, the municipal government only provided broad outlines for the regulations, without detailed workable guidelines. Now, the regulations are set through a

bottom-up (rather than through a top-down) process, based on understanding the situation and problems of the value chain.

It is necessary for the municipal government to help organize the association at the initial stage, since such kind of traditional association of pork supply chain has never existed before in Beijing. It also plays the role of linking the function between the municipal government and the pork production chain. Also it is not realistic to solely rely on the power and knowledge of the pig farmers and other actors of this production chain to form this association.

The most important task of this association is to enhance the production standards of pork industry from the feed supply to the retailers. All the rules and regulations formed by the association should be obeyed by all actors that are involved. The association can help the actors of this chain to improve the quality of their products and the whole production process, provide logistic service, and strengthen the relationship among the sale network members, so as to meet the ever-increasing demands of the society and the national markets.

As regard to pork chain information flow, there is a need to establish a transparent pork information system. The pork association should publicize monthly information on the feed supply price, production amount of each slaughterhouse and its average price, amount of market demands of each district and the average sale price.

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APPENDICES

ANNEX 1 Research questionnaire (pig farmers)

Research time:

Research place:

- 1) What is the annual quantity pig production?
A. 1-49 B. 50-199 C. 200-2000 D more than 2000
- 2) How many types of farmers in Beijing?
- 3) Does any quality control system in this farm?
A. Yes B. No
- 4) What is the quality control system in this farm? (If it is yes for question 3)
- 5) Why do use this quality system?
- 6) Do you have cooperation with each other farmers or companies?
A. Yes B. No
- 7) What are annual costs per year?
A. Less 5000RMB B. 5000-19999RMB C.20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 8) What are the main costs and rate? (for example: feed)
- 9) What are annual incomes per year?
A. Less 5000RMB B. 5000-19999RMB C.20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 10) How many days from the piglets to slaughter?
- 11) What are the main problems in this pig farm?
- 12) What are the support policies from government department?
- 13) Can you get information in time?
A) Yes B) No
- 14) What is the most important element to influence the pork production?
A. Price B. Quality C. Brand D. Environment E. others
- 15) What are main problems about quality in this farm?
- 16) How do you control the quality of pig?

17) How do you control the sow, feed, environment, immunization, vaccination and drugs?

18) Are you sufficient relationship with broker, slaughter or supermarket?

A. Yes B. No

19) Do you want cooperation with broker, slaughter or supermarket?

A. Yes B. No

20) What is the main marketing channel?

21) How to interventions and Encourage Small Scale Farmer?

ANNEX 2 Interview questions (brokers)

Research time:

Research place:

- 1) Do you have cooperation with farmers or slaughterhouse companies?
A. Yes B. No
- 2) How many levels of broker and what are the different functions among every broker?
- 3) What are annual costs per time?
A. Less 5000RMB B. 5000-19999RMB C. 20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 4) What are the main costs? (For example: quarantine, transportation)
- 5) What are annual incomes per time?
A. Less 5000RMB B. 5000-19999RMB C. 20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 6) What are the main problems from your position?
- 7) What are the support policies from government department?
- 8) How to control the animal health and quality?
- 9) Are you sufficient relationship with farmer, slaughter and supermarket?
A. Yes B. No

ANNEX 3 Interview questions (slaughterhouse)

Research time:

Research place:

- 2) How many pigs can you purchase from pig farmers per day?
A) 100-499 B) 500-999 C) 1000-1499 D) more than 1500
- 3) How many pigs can you slaughter per day?
A) 100-499 B) 500-999 C) 1000-1499 D) more than 1500
- 3) What is the utilization rate in this slaughterhouse?
- 4) Do you have pig farms in this slaughterhouse?
A) Yes B) No
- 5) What are annual costs per time?
A. Less 50000RMB B. 50000-199999RMB C. 200000-999999RMB
D. 1000000-9999999RMB E. More than 10000000RMB
- 6) What are the main costs? (For example: quarantine, slaughter)
- 7) What are annual incomes per time?
A. Less 50000RMB B. 50000-199999RMB C. 200000-999999RMB
D. 1000000-9999999RMB E. More than 10000000RMB
- 8) Does any quality control system in this farm?
A. Yes B. No
- 9) What is the quality control system in this farm? (If it is yes for question 3)
A. HACCP B. ISO C. GAP D. Others
- 11) What are the support policies from government department?
- 12) What are the main problems in this slaughterhouse?
- 12) What is the main production process in slaughterhouse?
- 13) Are you sufficient relationship with farmer, broker or supermarket?
A. Yes B. No

ANNEX 4 Interview questions (wholesaler market)

Research time:

Research place:

- 1). How many pigs can you sell per day?
A) 100-499 B) 500-999 C) 1000-1499 D) more than 1500
- 2). How many pork brands in this wholesaler market?
- 3) What are annual incomes per day?
A. Less 50000RMB B. 50000-199999RMB C. 200000-999999RMB
D. 1000000-9999999RMB E. More than 10000000RMB
- 4). What are the incomes?
- 5) What are the main drawbacks in this wholesaler market?
- 6). How to control the pork quality during in this wholesaler market?
- 7) What is the main role of wholesaler market?
- 8) What is the quarantine and management sketch map in wholesaler market?

ANNEX 5 Interview questions (Open market and small scale of supermarket)

Research time:

Research place:

- 1) Does any quality control system in this open market or supermarket?
A. Yes B. No
- 2) What is the quality control system in this open market or supermarket? (If it is yes for question 3)
A. HACCP B. ISO C. GAP D. Others
- 3) What are annual costs per day?
A. Less 5000RMB B. 5000-19999RMB C.20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 4) What are the main costs? (For example: tax, transportation)
- 5) What are annual incomes per day?
A. Less 5000RMB B. 5000-19999RMB C.20000-99999RMB
D. 100000-999999RMB E. More than 1000000RMB
- 6) What is the most important element to influence the pork production?
B. Price B. Quality C. Brand D. Environment E. others
- 7) What are main problems about quality in this open market or supermarket?
- 8) How do you control the quality in this open market or supermarket?
- 9) What is the characteristic in this open market?

ANNEX 6 Interview questions (big supermarket)

Research time:

Research place:

- 1) How many kilograms can you sell per day?
A) 100-500kg B) 501-1000kg C) more than 1000kg
- 2) Does any quality control system in this supermarket?
A. Yes B. No
- 3) Do you have cooperatives with any slaughterhouse?
A. Yes B. No
- 4) What are the main costs? (For example: tax, transportation)
- 5) What is the most important element to influence the pork production?
C. Price B. Quality C. Brand D. Environment E. others
- 6) How about quality control in this supermarket?
- 7) What are the charges to enter the supermarket?
- 8) What is the characteristic in this supermarket?

ANNEX 7 Interview questions (consumer)

Research time:

Research place:

- 1) What is the annual quantity pork production per month?
A. less 1 Kilo B. 1-2 Kilos C. 3-5 Kilos D. more than 5 Kilos
- 2) Do you think that the pork production is safety enough?
A. Yes B. No
- 3) What is the critical point to buy pork production?
A. Price B. quality C. Place D. Environment E. Brand F. Others
- 4) Do you care the quality of pork?
A. Yes B. No
- 5) What is the main way to get the information about pork quality?
A. Magazine B. TV C. Internet D. Friends E others way
- 6) What is the critical point when you choose the pork production?
A. Price B. Fresh or not C. Rate of muscle D. Nutrition level E. Others

ANNEX 8 Product Board for Livestock, Meat and Eggs (Netherlands)

The product boards were established in the 1950s. This legislation stemmed from a desire, on the part of the government and private enterprise and on the part of individual sectors, to cooperate with one another in fields where their interests coincided or overlapped. The Product Board for Livestock, Meat and Eggs (PVE) discusses aspects of policy with representatives from their own sectors and also with the government. They maintain good contacts with the Dutch Ministry of Agriculture, Nature and Food Quality, the Dutch Ministry of Health, Welfare and Sport and also with civil-society organizations.

The PVE is authorized to lay down binding regulations that hold for the sectors they represent. They may also draw up voluntary regulations. Now that the Dutch government is delegating more and more tasks, the individual sectors are acquiring ever more responsibility for financial and organizational matters. In this respect the PVE acts as a consultation forum, knowledge and information center, a financier and an initiator for the benefit of the various sectors they represent.

Technical regulations

To ensure that farmers receive fair payments, the PVE has drawn up both voluntary and compulsory regulations for the slaughtering, weighing and classification of live animals and carcasses.

Function as a public body

In their capacity as a public body, the PVE has legal means for collectively arranging various issues in their sectors at their own discretion. The compulsory levies prevent the risk of 'free riders' making use of services free of charge. The PVE's power of joint management activities enables them to handle matters in a practical, company-oriented way.

Social affairs

Cooperation between employers' associations and trade unions is part of the rationale of the PVE. Their Executive Board includes representatives of the unions, indicating that the PVE plays a part in socio-economic affairs. The unions also emphasise that the social consequences of the PVE's general policy must always be carefully considered. The PVE undertakes activities in the field of sustainable employment. These cover a wide range: research on working conditions and the labour market, RSI prevention, the preparation of professional profiles, the monitoring of employment in the various sectors, the development of labour market projects and the promotion of employee participation. Service the PVE fulfils a special role in coordinating the individual links in the chain. This role finds expression in the Dutch quality assurance system, which is known as Integrated Chain Control (IKB).

Financing

The PVE has two major sources of income: levies and their compensation for joint management. Levies are imposed for example on the slaughtering or export of livestock or on the keeping of animals.

Communication

The PVE's policy can succeed only if it is widely supported both within and outside the sectors concerned. Communication is an important tool in this respect, which is used to gain support for objectives, viewpoints and principles.

Environment

One of the PVE's objectives is sustainable cooperation with environmental and welfare organizations. The boards aim to act as a platform for the sectors they represent, for the purpose of cooperating with organized social interest groups in encouraging developments aimed at arriving at production methods that are beneficial to animals, humans and the environment.

Breeding

The PVE implement their breeding policy in the context of joint management. Activities in this field include the inspection and approval of handbooks, and breeding value estimations for the purpose of creating a context within which breeding organizations will be able to achieve the best possible results and enable the Dutch animal husbandry sector to benefit from their expertise.

Animal welfare

Animal welfare is of major importance. In this context the PVE are involved in formulating regulations for veal calves raised in group pens, free-range pigs and free-range poultry. The PVE moreover strongly support the biological pig-farming agreement aimed at producing half a million biological pigs per year. The boards regularly consult the relevant social organizations and they are represented in the Board for Animal Affairs, whose main concerns are animal health and welfare, but also biotechnological applications.

Total surveillance of animal production

The PVE have developed Production Chain Surveillance (IKB) programmed in order to be able to guarantee the quality, source and production methods of the various domestic animals and eggs. Products that are traded under the logo of these programmed come from farms and slaughterhouses where regular inspections are performed to check the quality of feed, the use of medicine and growth-promoting agents, and issues like hygiene and transport. These inspections are carried out by independent organizations. Any party involved in the production chain, from livestock farmers to butchers, may participate in the surveillance programmed on a voluntary basis. (Source: <https://bedrijfsnet.pve.agro.nl/eng/publications>)

ANNEX 9 List of interviewees

Name of people	Date	Name of company and headship	Place
Liu Fuli Wan Xinyou Li yan	11-12 of July, 2008	Agricultural department of Beijing Municipal Goverment	
Liu Xiaoyu	13 of July, 2008	Agricultural bank of China in Beijing	
Liu Xing	14 of July,2008	Beijing meat trade protect and pig production association	
Lu Jiangwei Zhao Zhiling Gao Ming Liu Mingxu	15 of July, 2008	Traditional farmers in Beijing	Shuangzhuang village, Haidian district of Beijing
Ma Liang Huang Junli Li Wen Liu Yullong	16 of July, 2008	Traditional farmers in Beijing	Majunqiao town, Tongzhou district of Beijing
Geng Lili Wei Liangxuan Wang Jing Liu Deman Gao Lei	18 of July, 2008	Traditional farmers in Beijing	Miyun village, Miyun town, Miyun district in Beijing
Wang Chengku Sun Lirong Li Fucheng He Maolei	20 of July, 2008	Cooperative farmers in Beijing	Qianyechang village, Anding town, Daxing district of Beijing
Dai Yibin Sun Jiajie Yu Wei	21 of July, 2008	Cooperative farmers in Beijing	Zhangyiying town, Daxing district of Beijing
Han Quanyou Wang Zhigang Li Dawei	23 of July, 2008	Large-scale pig farmers	Daxingzhuang town, Pinggu district of Beijing
Wang Hailong He Maolei Sun Jian Zhang Benpeng	24 of July, 2008	Large-scale pig farmers	Shicheng and Xiaohuang town, Miyun district of Beijing
Zhou Xiaoyu	25-26 of July,2008	Deputy manager in Dahongmen food products co., Ltd	Lucheng town, Tongzhou district in Beijing
Li Bin Wang Zhaolong	27 of July, 2008	Pig Broker	Dahongmen food products co., Ltd

Zhou Wenyong Liu Dequan			
Yang Yufeng	28 of July,2008	Pig farmers	Dahongmen food products co., Ltd
Chen Wenxue	29-30 of July,2008	Manager in Yuegezhuang wholesaler market/open market	Luqiao village, Fengtai district of Beijing
Zhang Qingpeng Xu Weishuai	31 of july, 2008	Pork agent in Yuegezhuang wholesaler market	Yuegezhuang wholesaler market
Zhang Xiaoyang Gu Junfei Wang Dalei Wu Bingren Zhao Lei	2 of August, 2008	Consumer	Yuegezhuang open market
Kang Qiang	4 of August,2008	Manager of pork part in Shuitun wholesaler market	Shuitun village, Changpin district of Beijing
LI Weiming Zhao Xuri	5 of August,2008	Pork agent in Shuntun wholesaler market	Shuitun wholesaler market
Yu Yang	7 of August,2008	Deputy manager of pork part in Jinxiudadi open market	No.69,Fushi road, Haidian district of Beijing
Liu Liang	8 of July,2008	Manager of pork part in Huilongguan open market	Huilongguan town, Changping district of Beijing
Gong Xueyang	10 of August, 2008	Deputy managet in Nongda Chaoshifa supermarket	Yuanmingyuan west road, Haidian district of Beijing
Ma Liang Li Yanqing Gong Zhe Song Zhiqiang	11 of August, 2008	Consumer	Nongda Chaoshifa supermarket
Wang Dapeng	13 of August,2008	Deputy manager in Baiwangshangcheng shop of Merry mart supermarket	Dongbeiwang village, Haidian district of Beijing
Li Pen	14 of August, 2008	Deputy manager in Zhongguancun shop of Carrefour supermarket	Zhongguancun street, Haidian district of Beijing
Wang Fei Yang Zhiyi Li Libo Ma Xiaocui	15 of August, 2008	Consumer	Zhongguancun shop of Carrefour supermarket