THE CONTRIBUTION OF CHINESE RABBIT INDUSTRY AND ITS SUSTAINABLE DEVELOPMENT

LAPING WU[1] AND DONG HUANG[2]

1. Professor, College of Economics and Management, China Agricultural University
Email: *wulp@cau.edu.cn*
2. Ph.D. Candidate, College of Economics and Management, China Agricultural University
Email: *huangdong@cau.edu.cn*
Address: No. 17, Qinnghua East Road, Haidian District, Beijing, 100083, China

ABSTRACT

Based on industry development theory and Diamond model (Michael Porter, 1975), this paper studies Chinese rabbit industry development and contribution from following perspectives- resource endowment, market demand, related industry support, the strategy of rabbit farms and enterprises, so as to improve its sustainable development. The results show that Chinese rabbit industry has strong advantages on saving feed grain and creating more employments on its animal and husbandry industry, but the major constraints in short run are from small scale production, in long run China need upgrade its raising modes and enhance technical progress.

Key words: Chinese rabbit industry, Diamond model, contribution

Introduction

Compare with other animal industries in China, its rabbit sector is very small, but it ranks at top one in world rabbit industry. In 2012, rabbit meat output of China reached 761 thousand tons, which account for 1% of Chinese total meat output, but 40% of the world total rabbit meat output. At the same year, the rabbit stock of China is 221.58 million, which accounts for 30% of world total rabbit stock; the slaughtered rabbit is 487.77million, which accounts for 40% of world total; the rabbit meat output is 761 thousand ton, which accounts for 40% of world total; net export of Chinese rabbit meat is 10.9 thousand ton, which accounts for about 20% of world total rabbit exports.

Though the rabbit sector is still very small in China, however it shows strong growth potentials. Since 1990s, Chinese rabbit industry has experienced fast growth, the annual growth rate of rabbit meat output is much faster than other animal sectors. From 2005 to 2010 the growth rate of rabbit meat reached 6.29%, while during the same period the growth rates of pork, beef, mutton and chicken meat were only 2.75 %, 2.85%, 2.66% and 2.55% respectively. Table 1 shows that growth rate of rabbit meat output from 2001 to 2011 is 80.0%, which is much higher than that of pork or beef, and about twice of poultry.

Table1. Meat output and growth in China from 2001 to 2011

	Pork	Beef	Mutton	Poultry	Rabbit meat
2001	4051.7	508.6	271.8	1210	40.6
2002	4123.1	521.9	283.5	1250	42.3
2003	4238.6	542.5	308.7	1312	43.8
2004	4341	560.4	332.9	1351	46.7
2005	4555.3	568.1	350.1	1464	51.1
2006	4650.5	576.7	363.8	1507	54.5
2007	4287.8	613.4	382.6	1448	60.2
2008	4620.5	613.2	380.3	1534	58.8
2009	4890.8	635.5	389.4	1595	63.6
2010	5071.2	653.1	398.9	1656	69.0
2011	5053.1	647.5	393.1	1709	73.1
Growth rate 2011/2001	**24.7%**	**27.3%**	**44.6%**	**41.2%**	**80.0%**

Data source: *China Rural Statistical Yearbook* (various years), China Statistics Press.

In order to improve the sustainable development of Chinese rabbit industry, this paper will firstly introduce contributions of Chinese rabbit industry in national economy, and then based on Diamond Theory (Michael E. Porter, 1990) we will analyze Chinese rabbit industry from both supply and demand sides, from farm/company strategy to related industry.

Material and method

Diamond Theory was developed by Michael Porter in 1990, which studies the competitiveness and determinants of an industry. It shows that the competitiveness of an industry is mainly determined by six broad factors: (1) production factor conditions, including both endowed factors (human resources, natural resources, capital and others) and developed factors by R&D investment; (2) demand situations, including domestic demand and world market; (3) related and supporting industries, such as upstream rabbit breeding, feed mill and downstream processing etc.; (4) corporate strategy structure and rivalry, such as marketing strategy, brand marketing etc. (5) Chance, which are occurrences outside of control of a firm. They are important because they create discontinuities in which some gain competitive positions and some lose; (6) the role of government, which is closely related to the contribution of the industry to national economy. Government policy has significant influences in the industry development (Michael E. Porter, 1990). Diamond theory can be illustrated with figure 1. The six groups of factors are related to each other, but their position in the chart forms a shape of *Diamond*. Chance and government are exogenous factors, which are determined outside the system.

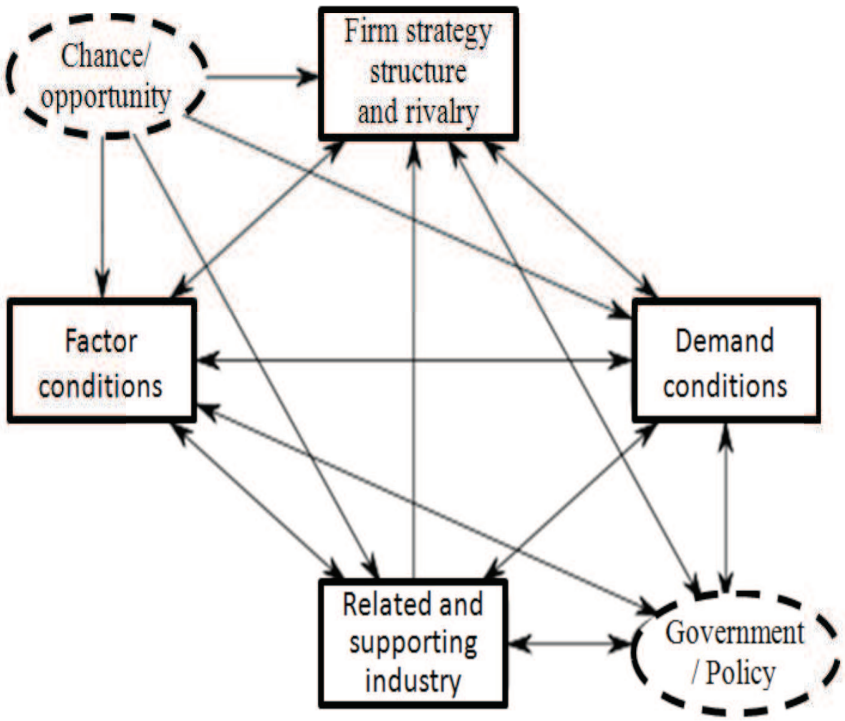

Figure 1 the Chart of Diamond Theory

Two dotted ellipses mean exogenous factors, the other four rectangles are endogenous factors, and the lines with arrows show the relations

In order to analyze the sustainable development of Chinese rabbit industry, we will follow Porter's industry analysis logic. *Chance* and *Government's policy* are exogenous, they will not be analyzed in details here, however the C*hance* will be mainly introduced in the contribution analysis, which reflects the importance of rabbit industry in China, and it is also the basis of *government's policy*. This paper will mainly focus on following four parts: *factor conditions*, *demand conditions, related and supporting industries* and *company strategy structure and rivalry*.

Data used in this paper includes the basic statistics of rabbit industry. All these data is from Ministry of Agriculture of China and State Statistical Bureau. Some of them are from FAO.

Results and Discussion

Contribution of Chinese rabbit industry

China raises different kinds of rabbits, including meat rabbit, skin rabbit (Rex Rabbit) and fur rabbit (Angola rabbit), with different production modes-big scale modern farms, medium scale specialized farms, small backyard family farms etc.

The big scale modern farms supply about 25% of slaughtered rabbit, small scale backyard farms raise about 35%, the medium scale farms (including cooperatives) provide about 40% (Chinese Rabbit Research System[6], CRRS, 2014). Based on a national survey by CRRS in 2011, the share of meat rabbit, skin rabbit (Rex Rabbit) and fur rabbit (Angola rabbit) are respectively 63.3%, 28.3% and 8.4%.

The first major contribution of rabbit industry is producing diversified products, including meat products, clothes and decoration made of furs and skins of rabbits etc. Though the share of rabbit industry in Chinese domestic animal industry is only about 1% in terms of output quantity or value, but it keeps the top one position in the world rabbit industry. In the world total, more than 90% of skin rabbit and fur rabbit are raised in China, for meat rabbit it also reach about 40%, ranking top one.

The second major contribution is creating employment and reducing poverty. Due to the dominant of scattered middle and small farms, rabbit industry creates a lot of employment in

[6] In 2009, Ministry of Agriculture of China launched a national project-China Rabbit Research System (CRRS), which focuses on technology but integrates it with scientific research and extension by laboratory research, farmer training and education, and marketing consultancy etc. Under CRRS, 19 scientists are selected from universities or research institutes all over China to collaborate in four research areas: (1) Genetic, Breeding and Reproducing, (2) Disease Prevention and Control, (3) Nutrition and Feed, and (4) environment control, processing and economic analysis. In order to provide good conditions for trial in production practice, 15 experiment stations are selected from 12 provinces, which include rabbit breeding farms and product processing companies. In order to ensure whole system run smoothly, in each year each scientist is funded by RMB 700 thousands (about USD 100 thousands), each experiment station can receive RMB 500 thousands for the cooperation with related scientists. The first period of CRRS is from 2011 to 2015, total fund for five years is RMB 105 million. The chief scientist is Prof. Yinghe Qin from China Agricultural University.

China, especially for the older rural labors, it is difficult for them to find other job. In China, compared with pig and other animal industry, raising rabbit has many comparative advantages: little investment, less pollution, short production period, high return or profit, easy start-up. Therefore, rabbit industry offers an effective way to poverty alleviation in Chinese poor areas.

Mengyin County of Shandong province, a typical poor county for a long time, located in the mountainous area, it has not many resource endowments, and however farmers become rich by raising rabbit and planting fruit tree (Xinhua News report, 2007). In Guangxi Zhuan Autonomous Zone and other poor areas, there are also many cases that farmers rely on rabbit industry to get out of poverty. Meanwhile rabbit excrement and other waste, which are much less than pig or other animals, are utilized to fruit or other trees. This recycle mode is very popular in many rabbit-raising areas.

Thirdly, rabbit industry also plays important role in solving food security problem. China faces fast decline in arable land area and rapid increase in population, in 2012 arable land area decreased by 46.7 million hectare but population increased by 70 million. This is a stable trend for many years. These put big pressure on Chinese food security. Raising rabbit can contribute to meat supply and saving feed grain. On one hand, the grain-conversion-ratio of rabbit is higher than pig and chicken, on the other hand small scale backyard farms can also make full use of the by-products from agricultural production or food waste from everyday life.

In order to save grain-especially feed grain, in 2011 Ministry of Agriculture of China passed *National Development Plan on Grain-saving Livestock (2011-2020)*, rabbit industry was given higher priority. From the contribution of rabbit industry and policy priority, Chinese rabbit industry has bright future.

In next four sections we will analyze the major determinants of rabbit industry development from production factors, demand, and industry and market environment.

Production factor conditions

The major production factors include land, labour, feed and other inputs. (1) For land, in China many medium and small rabbit farms are built in non-arable land areas (including farmer's backyard), many farmers make full use of existing buildings, such as unused schools or factories etc. Therefore, though China faces land shortage due to industrialization and urbanization, but rabbit-raising will not put so great pressure on land use as other industries.;(2) For feed, the big scale rabbit farms need buy commercial feed or process feed by themselves, though China faces shortage of high quality fodder such as alfalfa, but in different areas China has various local feed resources that can be used. As for medium or small rabbit farms, they use many by products, this can save feed greatly; (3) for labour, in recent years China gradually faces wage increase, rural labour cost also goes up. There is no wage statistics of rural labour, but the urban labour wage can also show this case. Figure 2 is the wage growth of urban labours employed in Agriculture, Forestry, Animal Husbandry and Fishery. It can be seen that wage turn to increase since 2001, though it decreased from 2008 to 2009 due to the economic crisis, however wage tends to increase, especially compared with the growth of ag GDP, wage increases rapidly.

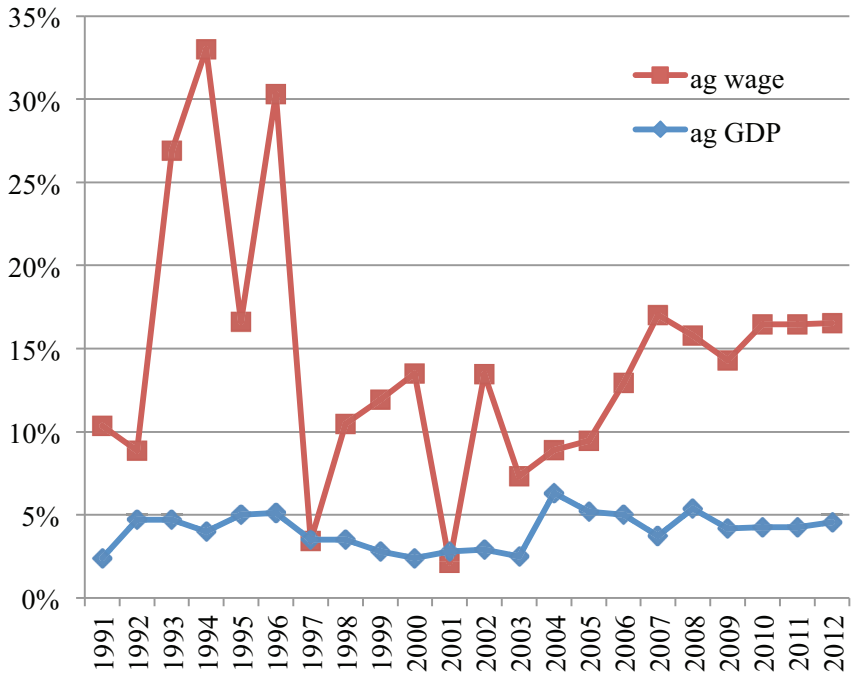

Figure 2 Annual growth rate of labour wage and GDP of primary industry

ag wage refers to wage of urban labours employed in Agriculture, Forestry, Animal Husbandry and Fishery; ag GDP refers to growth rate of primary industry GDP.

Though generally labour cost in China tend to rise, but for small backyard rabbit farms and most medium scale rabbit farms they mainly run the farms by farmers themselves, they hire less labours. Meanwhile, in many rabbit farms-even some large farms the labours are mainly elder people, they have less opportunity to find other better job, their opportunity costs are low. Therefore, the labour cost increase will not put too much burden on rabbit farms as other industry.

All above show that rabbit industry has strong comparative advantages, it has great potentials.

Demand conditions

Now Chinese rabbit meat is mainly sold domestically, only about 1.2% is exported. Fur and skin products are traded both domestically and internationally. There are no detailed statistics on rabbit fur and skin product trade. But the basic pattern for skin products is China imports raw rabbit skin from European countries and export processed skin products for a long time. For rabbit fur (Angola rabbit), China export both raw fur and fur products, and mainly to European countries.

Compared with others, rabbit products have many good characteristics. Rabbit meat is highly nutritious, which is characterized by high protein, low fat, low cholesterol, easy to digest. The annual per capita consumption of rabbit meat is about 3-5 kg or even more in developed countries such as France, Italy, Spain, while in China consumers haven't been aware of the good attributes of rabbit meat, the annual per capita consumption of rabbit meat is still very low (Table 2).

Table 2 Rabbit meat output, net export and per capita domestic uses

	Rabbit meat output (thousand ton) (1)	Net export (thousand ton) (2)	Population (million) (3)	Domestic uses* (kg per capita) (4)=[(2)-(1)]/(3)
2001	406	33.00	1276.27	0.29
2002	423	90.81	1284.53	0.32
2003	438	44.26	1292.27	0.34
2004	467	63.96	1299.88	0.35
2005	511	89.25	1307.56	0.38
2006	545	102.51	1314.48	0.41
2007	602	92.04	1321.29	0.45
2008	588	85.38	1328.02	0.44
2009	636	103.75	1334.50	0.47
2010	690	103.28	1340.91	0.51
2011	731	89.96	1347.35	0.54
2012	761	109.15	1354.04	0.55

Data sources: China Animal Husbandry Statistics, various years, China Agricultural Press; China Customs Statistics (http://www.haiguan.info/onlinesearch/TradeStat/StatCOMSub.aspx?TID=1). Domestic use refers to total uses, including direct consumption, company processing etc.

Though the per capita uses is very small, but it increases very fast, from 2001 to 2011 it increased by 86.2%, in year 2012 it reach 0.55 kg. Meanwhile, there are big differences across China, Sichuan, Chongqing and Guangdong are major areas where consumers has tradition to eat rabbit meat (Table 3), the survey data shows that per capita consumption in these three provinces are respectively 3.955 kg, 1.929 kg and 0.632 kg. Therefore even in Sichuan the rabbit consumption is still less than many developed countries. It can be expected that with income increase more people will pay attentions to health, rabbit meat will be gradually accepted by consumers and more will be consumed, there are big potentials in demand for rabbit meat in China.

Table 3 rabbit meat consumption in major areas

	Per capita consumption (kg)	Total regional consumption (ton)	% in national total
Sichuan	3.955	318081.3	55.23%
Chongqing	1.929	55632.0	9.66%
Jilin	0.653	17945.7	3.12%
Guangdong	0.632	65875.6	11.44%
Fujian	0.557	20543.4	3.57%
Inner Mongolia	0.515	12727.5	2.21%
Beijing	0.386	7575.8	1.32%
Hebei	0.318	22872.3	3.97%
Jiangsu	0.289	22732.0	3.95%
Henan	0.258	24264.2	4.21%
Zhejiang	0.114	6220.2	1.08%
Shanghai	0.063	1438.7	0.25%

In each year from 2011 to 2013, China Rabbit Research System selects major provinces to do consumption survey; the total samples in three years are 2600 consumer in 26 big cities. Data of this table is from the surveys.

Besides meat, rabbit industry also provide fur and leather products, China raises Rex Rabbit and Angola Rabbit, which produce high quality skin and furs and can be used to make clothes and other related products.

Related and supporting industry

Along the rabbit industry chain, there are many sections including breeding, feed processing, cages manufacturing, medicine producing, raising/feeding, product processing and marketing etc. All these are gradually commercial and need to be integrated.

In 1992 China started to build Socialist Market System, since then market reform has made great progress. In 2001 China joined the WTO, this accelerates the opening and reform. In 2004 government finally liberalized grain markets, since then markets are generally liberalized. Farmers and companies can freely choose whatever they want to produce.

Therefore the related and supporting industries in rabbit industry chain are growing rapidly. Many commercial feed companies are set up; more disease control services are provided by both governments and private companies; more rabbit product processing companies are built. More diversified processed rabbit products can be easily find in supermarkets or other retail markets.

We know from previous introduction that the CSSR play very important role in rabbit industry chain development, which integrates scientific research with technology and extension. The CRRS provides very prompt and efficient supports for farmers, feed and product processing companies, and other companies along whole rabbit industry chain. In past three years, the CRRS has bred several improved varieties and help farmers and government to preserve local varieties. The CRRS also train farmers in all major rabbit-raising areas. All these are essential to rabbit industry, and they will be improved more effectively and efficiently in future.

Company strategy structure and rivalry

As discussed previously, the rabbit farms in China are mainly medium or small scale, small scale farms lack of strategy and scientific decision. They usually follow other farmers' decision or suggestions from other companies.

Due to lacking of decision making ability, farmers cannot make production decision optimally. When expecting price increase in future, they are sure to increase production, but they don't know how much of production should be increased. Risk aversion farmers will increase production at certain extent, but adventurous farmers usually will produce more than optimal level. Some farmers will follow other farmers' decision, which causes fast increase in production when expecting price rising, vice versa. We know that small and medium farms raise more than 75 % of rabbits; this will influence market greatly, so their production decision will enlarge price fluctuation. This also means that they need help in decision making.

It is also difficult for small farms to improve standardization, which affects negatively brand-building and marketing, and impede modern rabbit industry development. Small scale farms will also enlarge market fluctuation.

Recognizing the contradiction between small farms and big markets, now governments encourage enlarging farm scale, and supporting farmers to organize by cooperatives or contract with big companies so as to adapt to big markets.

Conclusions

In above sections we analyze Chinese rabbit industry from both supply and demand sides; generally Chinese rabbit industry has comparative advantages, it faces good chance.

However, rabbit industry also face some challenges including small scale production, which causes difficulty in disease control, low efficiency and low standardization. Therefore how to improve upgrading of rabbit industry is becoming a big issue that should be solved as soon as possible.

Generally Chinese rabbit industry saves feed grain, creates more employments to increase farmers' income and reduce poverty, and receives much supports from governments and research institutes. This entire means that Chinese rabbit industry has solid basis and favorable conditions for sustainable development.

References

Chinese Rabbit Research System, 2014. The sustainable development of Chinese Rabbit Industry, *China Agricultural Press: Beijing*.

Ferto I. , Hubbard L. J. 2003. Revealed comparative advantage and competitiveness in Hungarian agri-food sectors. *The Journal of World Economy, 26(2), 247–259.*

Jensen H. H.,Voigt S. W., Hayes D. J.1995. Measuring international competitiveness in the pork sector. *Agribusiness (New York) , 11(2):169-177.*

Karikari P. K., Asare K.2009. An economic analysis of a smallholder meat rabbit production system. *American-Eurasian Journal of Sustainable Agriculture , 3(3) , 502-506.*

Klasra M.A., Fidan H. 2004. Competitiveness and the trade of livestock products: a comparative study between Turkey and its neighbouring countries. *Journal of Applied Science, 4(4): 663–668.*

Laping Wu, Rui Gu, Xuanfu Li, 2012. The International Competitiveness of China's Rabbit Sector. *In: 10th World Rabbit Congress, Egypt, Sep. 3-6.*

Leishman D. ,MenkhausD. J. ,Whipple G. D.2000. Revealed comparative advantage and the measurement of international competitiveness for wool. *Sheep & Goat Research Journal ,16(2), 58-64.*

Lloyd P.J. , Toguchi H. 1996. East Asian export competitiveness: new measures and policy implications. *Asian Pacific Literature, 10(2): 1–15.*

Michael E. Porter, 1990. Competitive Advantage of Nations. *Harvard Business Review. March-April: 73-91.*

Xinhua News Report, 2007. How Does Small Rabbit Become Big Industry in Mengyin County of Shandong Province, *http://www.ln.xinhuanet.com/xnc/2007-11/01/content_11593301.htm December 1, 2007.*