

## Relationship between China's Economic Growth and Pork Production & Feed Grains

Mr. Hiroshi Takahashi  
Executive Director  
Bridge International Inc.

### 1. Influence of China's Livestock Industry on Surging World Grain Prices

#### **[Introduction]**

The author receives a growing number of inquiries about the status of the China's livestock industry in these years. The topics have drastically changed compared to those often brought up four or five years ago, in which, people used to ask about various problems, trend, and safety issues related to processed food products such as sausages, gyoza dumplings and heated meat that were imported from China to Japan. The author especially remembers the incident of insecticide contamination of Chinese-made dumplings that took place in January 2008, about which he received a lot of questions about and requests for comment on "safety of Chinese foods" and "background of the incident" from mass media or people involved in the industries concerned.

At present, a majority of the questions are "how the feed grain supply and demand situation will change, when considering meat production and the current meat consumption growing in line with the economic development in China." Questions were often asked about food exports from China to Japan in the past, but now those questions have been almost completely replaced with those related to the distribution of meat and the supply and demand of feed grains in the huge Chinese market.

If the international prices of feed grains go up, the increase will be inevitably passed on to the meat prices, which may eventually cause other product prices to rise. Since China is the gigantic meat consumer country and its pork consumption accounts for about 50% of the world total consumption, close attention should be given to the meat production and consumer trends in China as a key country to see the global trends in feed grains.

Table 1 shows the pork production and distribution trend of major countries in 2011. As indicated by the table, the number of swine raised in China is 477 million heads. Looking at the supply and demand of pork, its production, imports, exports and consumption are 49.5 million tons, about 1 million tons, 244,000 tons and 49.6 million tons, respectively. As easily understood from the figures in the table, Chinese people raise swine more than 50% of the world total, and produce and consume pork. It is not too much to say that the trend of this giant pork producing country has already determined the grain supply and demand in the world. This paper reports on the grain supply that is expected to be adversely affected by the worst drought in half a century in the United States, as well as China's pork production and trends in grain demand.

**Table 1 Changes in Pork Production and Distribution in Major Producing Countries**

High production volume ranking	Major countries	Pork production	Number of raised pigs	Number of slaughtered pigs	Exports	Imports
		1,000 tons	1,000 heads	1,000 heads	1,000 tons	1,000 tons
1	China	49,500	477,125	660,622	244	992
2	EU27	22,750	150,773	263,200	1,900	-
3	U.S.	10,332	64,925	115,547	2,356	364
4	Brazil	3,227	36,652	37,750	584	-
5	Russia	1,995	17,231	30,650	-	946
6	Vietnam	1,960	27,373	43,400	8	-
7	Canada	1,770	11,895	28,653	1,197	204
8	Japan	1,267	9,768	16,508	-	1,254
9	Mexico	1,182	9,007	16,350	78	678
10	Korea	837	8,449	13,308	78	678
	<b>World total</b>	<b>101,662</b>	<b>799,951</b>	<b>1,200,631</b>	<b>6,982</b>	<b>6,595</b>

Quantity based on carcass, (2011) Source: USDA FAS April 2012

Numbers of raised and slaughtered pigs in Vietnam (2010) Source: FAOSTAT

Numbers of raised and slaughtered pigs in Japan (Fiscal 2011) Source: "Statistical Survey on Meat Marketing" released by the Ministry of Agriculture, Forestry & Fisheries

China's imports are divided into 560,000 tons from major ports in China and 432,000 tons from Hong Kong

### **[Overview of Pig Farming Industry in China]**

Please see "Table 2 Basic Data for Pig Farming Industry in China." The number of pig farmers in China is 67 million in 2010 of which 2.5 million farmers annually ship 50 or more heads. This demonstrates that, in farming regions in China, most pigs are raised in farmer's backyard just as in Japan 50 years ago. However, the number of pig farmers is substantially decreasing these days, and, also as in Japan, corporate pig farmers will sooner or later become the mainstream, following a natural course of development.

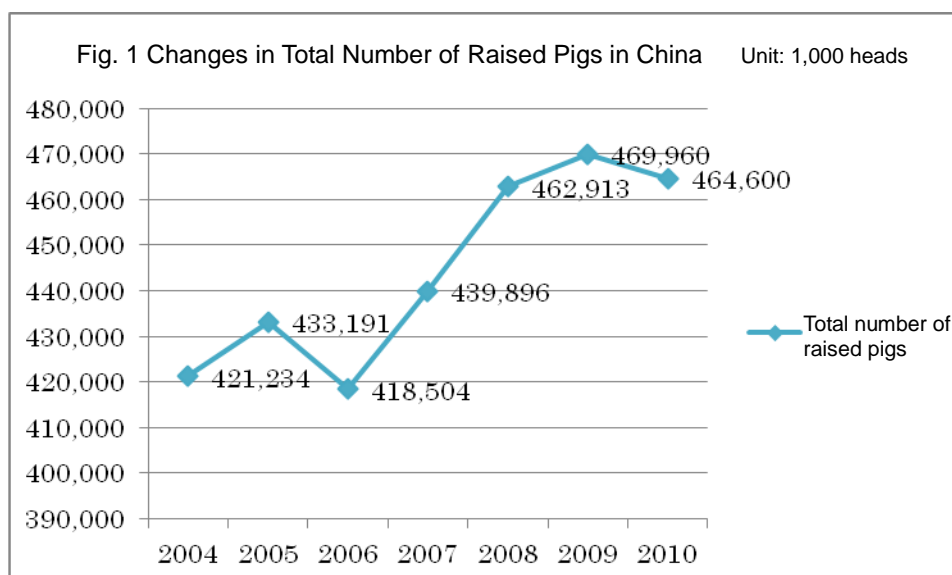
Since most pigs are yet produced by backyard pig raisers in China, a three-year pig cycle is seen and, subsequently, the numbers of raised pigs and shipped pigs as well as the prices of live pigs currently vary in accordance with the cycle. During a period from 2006 to 2007, coupled with the decrease in producers' motivation to raise pigs due to lower pig prices, the soaring grain prices, the Great Sichuan Earthquake and the swine epidemic (porcine reproductive and respiratory syndrome: PRRS) significantly reduced pork production volume.

From the late 2007 to 2008, their motivation was increased by effective countermeasures against epidemics and higher pork prices, which resulted in an increase of pork production. An oversupply drove down the prices in 2009, which then began to rise in the late 2010. The National Carcass Market Price (see Fig. 6 Average Producer Price of Major Slaughter Corporations) hit a historic high of 25.85 RMB (323 yen)/kg in September 2011, and was in a downward phase of the pig cycle in early 2012.

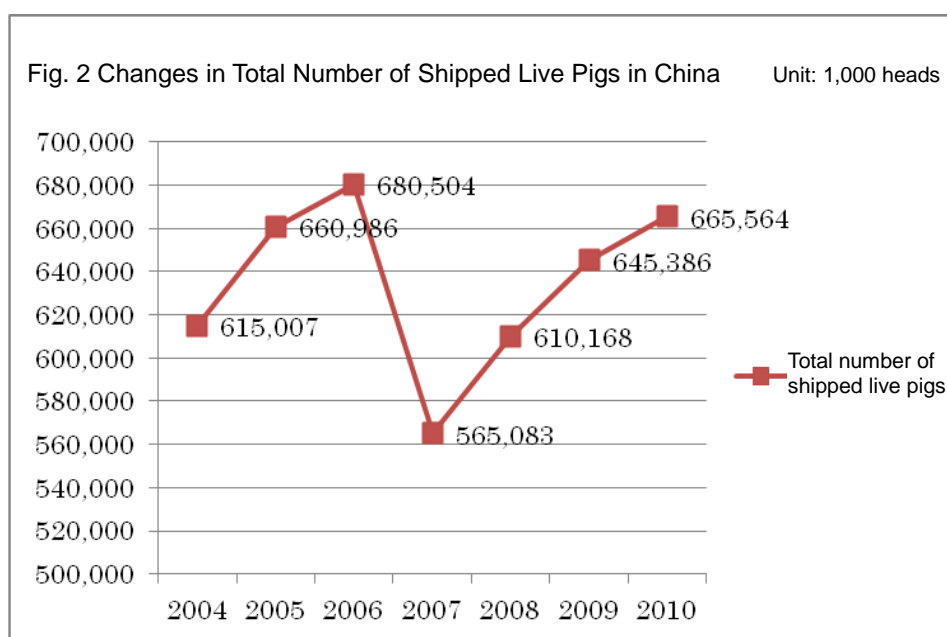
**Table 2 Basic Data for Pig Faming Industry in China**

	Unit	2004	2005	2006	2007	2008	2009	2010
Population	million people	1,299.88	1,307.56	1,314.48	1,321.29	1,328.02	1,334.50	1,340.91
	Urban area	42%	43%	44%	46%	47%	48%	50%
	Rural area	58%	57%	56%	54%	53%	52%	50%
Number of pig farmers	1,000 farmers	na	na	na	82,349	72,382	67,137	na
Number of pig farmers shipping 50 or more heads a year	1,000 farmers	1,437	1,836	2,107	2,244	2,421	2,538	na
Total number of raised pigs	1,000, heads	421,234	433,191	418,504	439,896	462,913	469,960	464,600
Number of raised pigs per farmer	Heads	na	na	na	5.3	6.4	7.0	na
Number of sows for breeding	1,000 heads	46,052	48,930	na	42,338	46,788	49,577	na
Number of live pigs shipped	1,000 heads	615,007	660,986	680,504	565,083	610,168	645,386	665,564
Pork production	1,000 tons	43,410	45,553	46,505	42,878	46,205	48,908	50,712
Consumption per capita	Kg	34	35	38	33	35	37	38

Source: ALIC, China Statistical Yearbook, China Livestock Industry Yearbook, FAOSTAT



Source: Graph from Table 2 (created by the author)



Source: Graph from Table 2 (created by the author)

### [Relationship between China's Pig Farming and Feed Prices]

Let's look at the influence of feed prices on the pig production in China. Table 3 shows the comparison between live pig prices and corn prices. In China, an indicator obtained by dividing live pig price by corn price is used to roughly estimate a break-even point of pig production. The break-even point is said to lie between 5.5 and 6.0 (see Fig. 5). In other words, if the index is below the point, producers suffer losses, and, on the contrary, if it is higher, they earn profits,

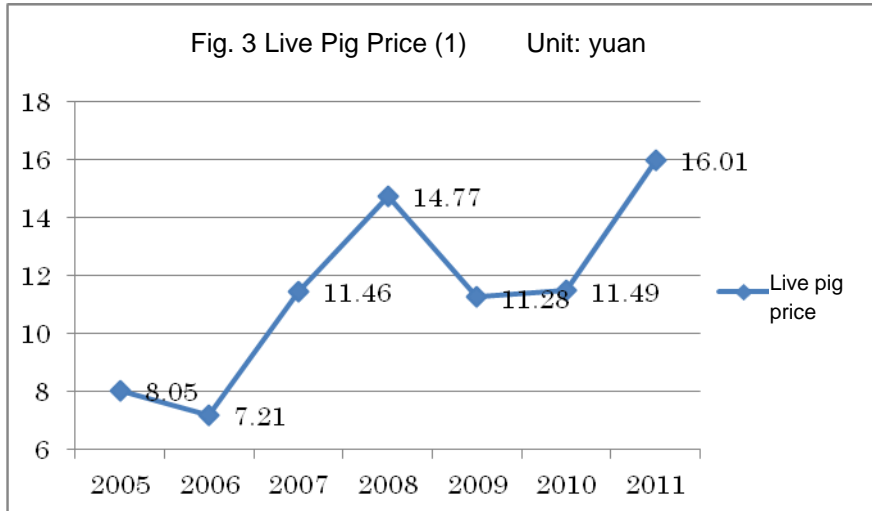
The index moved below the point in 2006 and 2010, and producers suffered losses. As a reaction, pork market prices went up in the following years and Chinese pig producers run profitable operations, which raised their motivation to expand production scale. Then, this results in an oversupply, and, as mentioned earlier, at present they are in a downward phase of the pig cycle

**Table 3 Comparison between Live Pig Prices and Corn Prices in China**

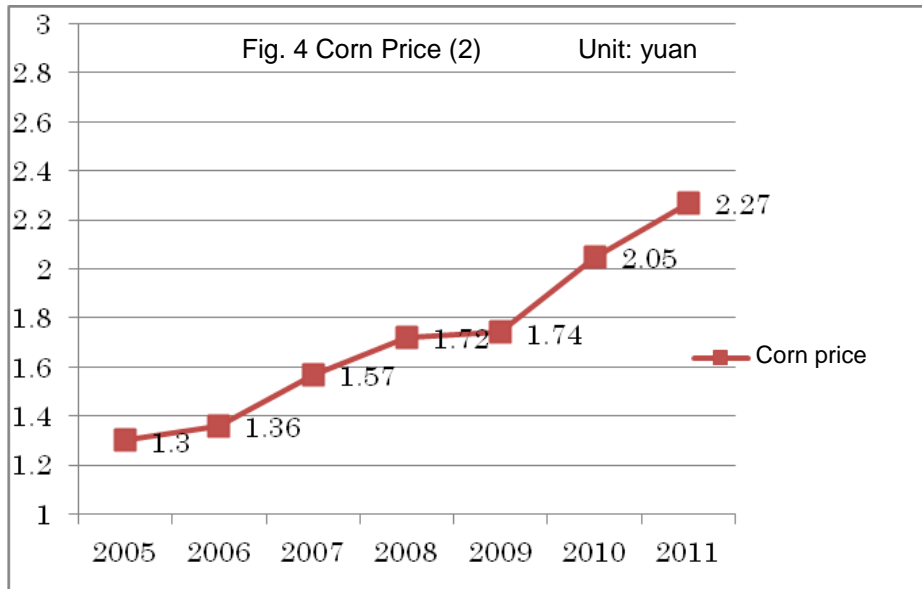
Year	2005	2006	2007	2008	2009	2010	2011	2012
<b>Live pig price ① RMB/kg</b>	8.05	7.21	11.46	14.77	11.28	11.49	16.01	14.53
<b>Corn price ② RMB/kg</b>	1.3	1.36	1.57	1.72	1.74	2.05	2.27	2.52
<b>① / ②</b>	6.19	5.30	7.30	8.59	6.48	5.60	7.05	5.77

Source: ALIC National Bureau of Statistics of China "China Agricultural Product Prices Yearbook," Website of National Bureau of Statistics of China

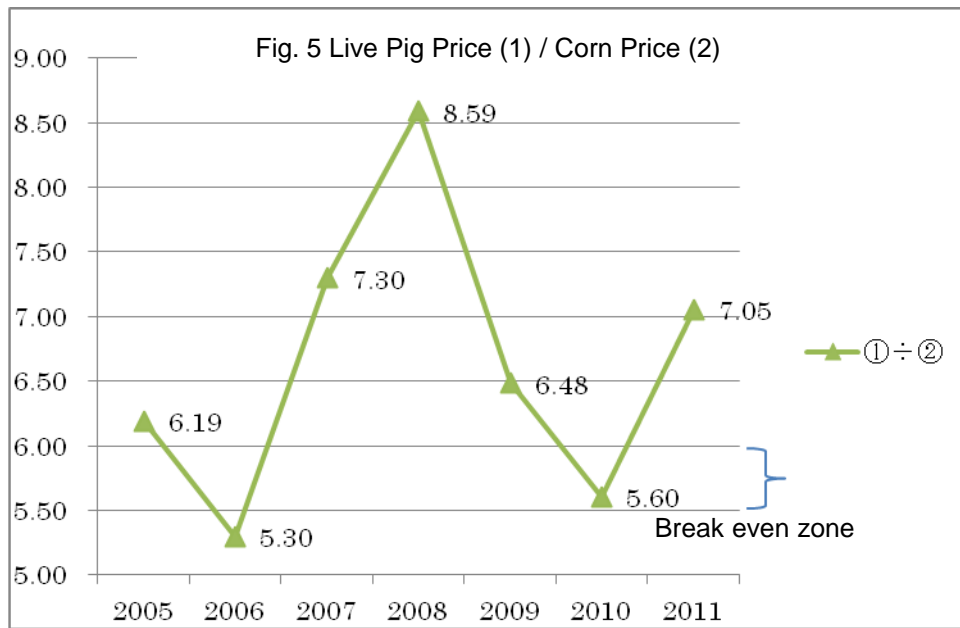
Note: Figures for 2012 are as of August 15.



Source: Graph from Table 3 (created by the author)

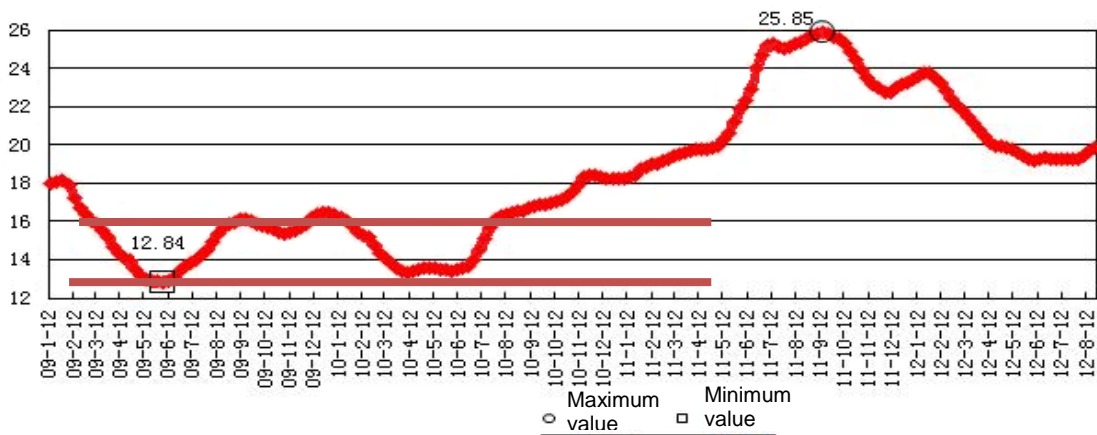


Source: Graph from Table 3 (created by the author)



Source: Graph from Table 3 (created by the author)

**Fig. 6 Average Pork Carcass Producer Price of Major Slaughter Corporations in China**



Unit: RMB (1 RMB = 12.5 yen)

Source: National Average Producer Price of Pork by Ministry of Commerce of the People's Republic of China

(Supplementary description)

Looking at the carcass prices in China in Fig. 6, you will probably find that they are "higher than expected." This is because the global feed prices have a significant effect on the pork prices in China.

This is a little off the subject of this paper, but careful readers would think that there is something strange about the relationship between the pork productions (carcass base) and the numbers of slaughtered pigs of main countries in the world shown in Table 1. The calculated (divided) carcass weight per head in Vietnam is as small as about 45 kg but the figure in the table is correct. Producers in Vietnam raise small pigs crossbred with the local breeds (so-called miniature pigs).

## 2. Effects of Pork Production, Meat Demand, Consumer Trends and Grain Demand in China on World Grain Supply and Demand

### [Relationship between Meat and Grains]

This section explains the pork demand and consumer trends in China and their effect on the grain supply and demand in the global market. First, let's see the relationship between meat and grains.

As a matter of course, meat cannot be produced without grain feeds. In other words, the world's largest meat (mainly pork) producer, China, has already retained its first position as a feed grain consumer in the world. Accordingly, the meat production (and consumer) trends in China will have a significant effect on the global grain supply and demand trends in the future. Feed grain requirements to produce 1 kg of meat from cattle, hog and chicken are shown in Table 4.

**Table 4 Feed Grain (Corn) Required for 1 kg of Meat** Unit: kg

Broiler	Feed conversion ratio	Slaughtered carcass	Dressed carcass	Boneless meat
Grain required for 1 kg of meat (kg)	2.00	2.31	2.96	4.80
Pork	Feed conversion ratio	Dressed carcass	Boneless meat	Dressed meat
Grain required for 1 kg of meat (kg)	3.00	4.42	6.34	6.46
Wagyu	Feed conversion ratio	Dressed carcass	Boneless meat	Dressed meat
Grain required for 1 kg of meat (kg)	9.43	14.96	20.92	21.26

Source: Calculated by the author based on the data released by the Statistics Department of the Ministry of Agriculture, Forestry and Fisheries

Since many similar data confuse the figures of carcass (with bone) with those of boneless meat, the author himself calculated the above figures using feed conversion ratio and yield rate after slaughtering. China produces about 50 million tons of pork carcasses at present, and a simple calculation shows that 221 million tons of corn (50 million x 4.42) is required for the production. Of course, livestock animals are not raised by feeding corn alone. So, this is added just as a reference indicator.

### [World Grain Supply and Demand]

Please see Table 5. This is Corn Supply and Demand Estimates released by the United States Department of Agriculture (USDA) on September 12, 2012. The U.S. corn producers experienced a poor harvest that is 86.8% of the previous year, due to the worst drought in half a century as you know. However, when looking at the world year-on-year change of 96.8%, the decline in the production is surprisingly smaller than expected. Then, why did international corn prices surge? This may be explained by the significantly growing demand in China.

Chinese corn producers enjoyed good harvest with domestic production of 200 million tons, a year-on-year change of 103.7%. China, however, became a net exporter because domestic consumption significantly increased by 13 million tons to 210 million tons (106.9% of the previous year). As Japan's corn imports (consumption) in 2011 is 16 million tons, this China's consumption increase (13 million tons) corresponds as much as 80% of the total annual consumption in Japan that is currently the world's largest importer.

**Table 5 2012 Corn Supply and Demand Estimates Released by USDA on September 12**  
Unit: million tons

Name of Country	2010/11	2011/12	2012/13				September	Year-on-year change
			May	June	July	August		
<b>U.S.</b>								
Domestic production	316.17	313.89	375.68	375.68	329.45	273.80	272.47	86.8%
Imports	0.71	0.64	0.38	0.38	0.76	1.91	1.91	300.0%
Domestic consumption	285.02	274.07	301.64	301.64	282.46	252.10	254.00	92.7%
Exports	46.59	39.12	48.26	48.26	40.64	33.02	31.75	81.2%
Year-end stock	28.65	30.00	47.78	47.78	30.05	16.51	18.62	62.1%
<b>Brazil</b>								
Domestic production	57.40	72.80	67.00	67.00	67.00	70.00	70.00	96.2%
Imports	0.79	0.80	0.80	0.80	0.80	0.80	0.80	100.0%
Domestic consumption	49.50	54.00	56.00	56.00	56.00	56.00	56.00	103.7%
Exports	8.40	14.00	12.00	12.00	12.00	14.00	14.00	100.0%
Year-end stock	10.28	15.88	12.88	13.88	12.88	16.68	16.68	105.0%
<b>China</b>								
Domestic production	177.25	192.78	193.00	195.00	195.00	200.00	200.00	103.7%
Imports	0.98	5.00	7.00	7.00	5.00	2.00	2.00	40.0%
Domestic consumption	180.00	188.00	200.00	201.00	201.00	201.00	201.00	106.9%
Exports	0.11	0.10	0.20	0.20	0.20	0.20	0.20	200.0%
Year-end stock	49.42	59.10	57.77	59.80	57.90	59.90	59.90	101.4%
<b>World total</b>								
Domestic production	830.77	876.84	945.78	949.93	905.28	849.01	841.06	96.8%
Imports	92.62	95.21	98.82	100.32	95.75	88.52	88.62	93.0%
Domestic consumption	849.07	868.35	921.01	923.39	900.51	861.64	856.7	99.2%
Exports	91.46	101.28	104.22	105.32	98.30	92.78	91.01	91.6%
Year-end stock	127.47	135.97	152.34	155.74	134.09	123.33	123.95	90.7%

Source: USDA/WAOB; World Agricultural Supply and Demand Estimates

Note: Crop years of respective countries are used.



## [Growth of Meat Consumption in China]

This section discusses the future grain demand and consumption in China from the perspective of meat consuming population.

**Table 6 Production Data of Livestock Industries in China**

	Unit	1999	2000	2007	2008	2009
Number of raised animals (as of the end of the fiscal year)						
Cattle	1,000	126,983	125,352	105,948	105,760	107,265
Beef cattle	1,000				52,533	59,188
Dairy cow	1,000	4,428	4,694		12,335	12,603
Swine	1,000	431,442	416,336	439,895	462,913	469,960
Sheep, goat	1,000	279,258	279,482	285,647	280,849	284,522
Poultry	1 million	4,550	4,640	5,020	5,280	5,330
Number of shipped animals						
Cattle	1,000	37,662	38,069	43,595	44,461	46,022
Swine	1,000	507,490	518,623	565,083	610,166	645,386
Sheep, goat	1,000	188,204	196,534	255,707	261,723	267,329
Poultry	1 million	7,430	8,260	9,580	10,220	10,610
Livestock production						
Beef	1,000 tons	5,054	5,131	6,134	6,132	6,355
	Kg/head	134.2	134.8	140.7	137.9	138.1
Pork	1,000 tons	38,907	39,660	42,878	46,205	48,908
	Kg/head	76.7	76.5	75.9	75.7	75.8
Sheep and goat meats	1,000 tons	2,513	2,641	3,826	3,803	3,894
	Kg/head	13.5	13.4	15.0	14.5	14.6
Poultry meat	1,000 tons	11,155	11,911	14,476	15,336	15,949
Raw milk	1,000 tons	7,176	8,274	35,252	35,538	35,188
Egg	1,000 tons	21,347	21,820	25,290	27,022	27,425

Source: ALIC Livestock Information Aug. 2011  
Calculation uses beef and pork carcasses and poultry meat with bone.

“China Agricultural Yearbook” by the Ministry of Agriculture of the People’s Republic of China, and “Rural Statistical Yearbook of China” by Agricultural Social and Economic Survey Office, under National Bureau of Statistics of the People’s Republic of China

Table 6 indicates the changes in total meat consumption for the decade from 1999 to 2009. The increase in meat production for the past 10 years as shown in this table is summarized as follows:

Summary of Table 6 (Growth rate in meat consumption from 1999 to 2009)

Pork	125.7%	Beef	125.7%		
Sheep and goat meats	155.0%	Poultry meat	143.0%	Total	130.3%
Raw milk	490.4%	Egg	128.5%		

China’s domestic meat production is so huge that we can ignore its import and export volumes. So, the meat production volume shown in the table above is almost equal to consumption volume.

For the past decade, production volumes of almost all livestock and dairy product items

have significantly increased. Among others, raw milk production shows an outstanding growth because the eating habits have become diversified and the consumption in metropolitan areas increased in response to the nation-wide campaign for raising awareness of nutrient values. Sheep and goat meats were mostly consumed only in the northern region in China but the consumption of those meats has greatly increased, which seems to be attributable to the popularization of hot pot cooking (*shabu-shabu* using lamb) throughout the nation. Meat demand in China is growing day by day as Chinese people eat more Western dishes. As an easy-to-understand example to describe the situation to the readers of this paper, the author takes the high-growth period of economy that took place 30 to 40 years ago in Japan.

### [Meat Consumption Increased by Urbanization]

**Table 7 Changes in Population of Urban and Rural Areas for 20 years**

Unit: 10,000 people

	1990	2000	2010
Percentage of urban population	30,195	45,906	66,978
	26%	36%	50%
Percentage of rural population	84,138	80,837	67,113
	74%	64%	50%
Total	114,333	126,743	134,091

Source: ALIC

According to “The Urban Blue Book: China City Development Report No 5” published by the Chinese Academy of Social Sciences (Beijing) in August 14, 2012, the urban population reached 691 million in 2011, exceeding the rural population for the first time, and the urbanization rate rose to 51.27% (total population: 1,347.7 million).

According to a recent press report on “Symposium: Demographic Challenges and Social Cohesion” held in Beijing on May 3 and 4, 2012, the National Population and Family Planning Commission of China presented that “the migrant population to urban areas in China reached 230 million in 2011 and the urban population will further increase by 300 million in the next 20 years.”

Migrant population means the workers who move from rural areas to cities and towns to work at plants, etc (farmers who work as migrant workers). The family registration system in China segregates the rural population from the urban population and makes it difficult for rural residents to move to urban areas. Therefore, rural residents who are working in urban areas are counted as a population without family registration in urban areas, or as a migrant population.

**Table 8 Breakdown of Meat Consumption Per Capita in 2007**

	Adjusted ratio		
Beef	4.67		
Estimated household use	1.54	33%	2.59 kg in urban areas; 0.68 kg in rural areas
Estimated commercial use	3.13	67%	
Pork	32.93		
Estimated household use	15.55	47%	18.21 kg in urban areas; 13.37 kg in rural areas
Estimated commercial use	17.38	53%	
Poultry meat	11.84		
Estimated household use	6.47	55%	9.66 kg in urban areas; 3.86 in rural areas
Estimated commercial use	5.37	45%	

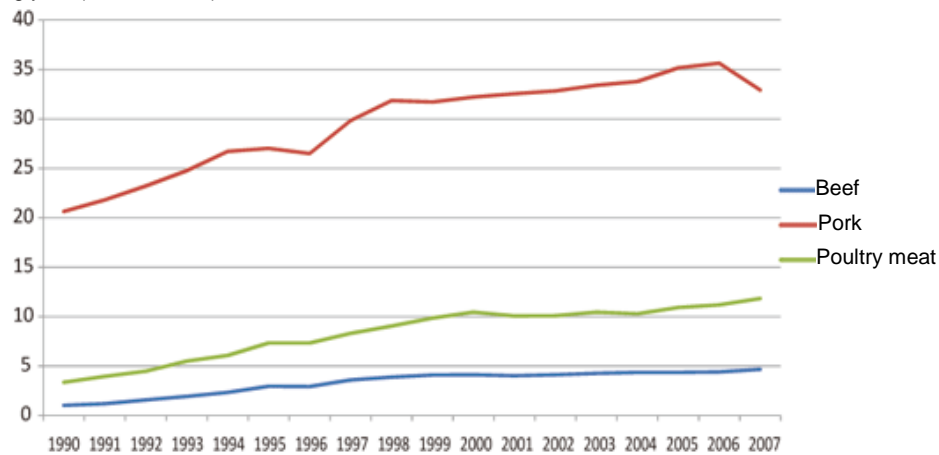
Source: ALIC; Livestock Information in August 2011 FAO; China Statistical Yearbook

Note: Carcass (meat with bone) base

As understood from the comparison in Table 8, the meat consumption in urban areas is substantially higher than that in rural areas in China. In order to estimate the future trend, let's calculate the increase in meat consumption in 2030, on the assumption that the urban population will increase by 300 million in next 20 years as estimated by the National Population and Family Planning Commission of China.

**Fig. 7 Changes in Meat Consumption Per Capita**

Kg/year (carcass base)



Source: ALIC; Livestock Information in August 2011 (FAOSTAT)

**Table 9 Estimated Consumption in Urban and Rural Areas in China in 2010**Unit: 1,000  
tons

	Urban area	Rural area	Total
Beef	4,392.5	1,155.6	5,548.1
Pork	29,429.6	21,651.1	51,080.8
Chicken	8,901.1	3,563.9	12,465.1

Source: Calculated by the author based on FAO; China Statistical Yearbook

Note: Carcass (meat with bone) base

**Table 10 Estimated Consumption in Urban and Rural Areas in China in 2030**

Unit: 1,000 tons

	Urban area	Rural area	Total	Difference from 2010	Feed conversion ratio	Shortfall of feed grains
Beef	6,360.0	639.0	6,999.0	1,450.9	15	21,763.5
Pork	42,611.4	11,972.9	54,584.3	3,503.6	4.5	15,766.0
Chicken	12,888.0	1,970.8	14,858.9	2,393.8	3	7,181.4
					Total	44,710.9

Source: Calculated by the author based on FAO; China Statistical Yearbook

Note: Carcass (meat with bone) base

First, Table 9 shows how much meat was consumed in urban areas and rural areas in 2010. Next, in Table 10, the author estimated the consumption in 2030, on the assumption that 300 million people will simply have moved to urban areas in that year and they will have the same consumption pattern as that in 2010. The results are summarized in Table 10. The shortfall of feed grains in Table 10 means the difference in requirements for feed grains between 2010 and 2030, that is, the volume of additional grains that will be required to produce meat to satisfy the demand in 2030. This additionally required volume equals to Japan's total corn imports for more than three years. It is estimated that China additionally needs as much as about 44.7 million tons of grains by simple arithmetic. Since the meat demand increases year by year in the China's huge market and the demand and imports of feed grains dramatically increase, a future decrease in feed grain prices may not be expected in the international market even if we experience a good grain harvest all over the world.

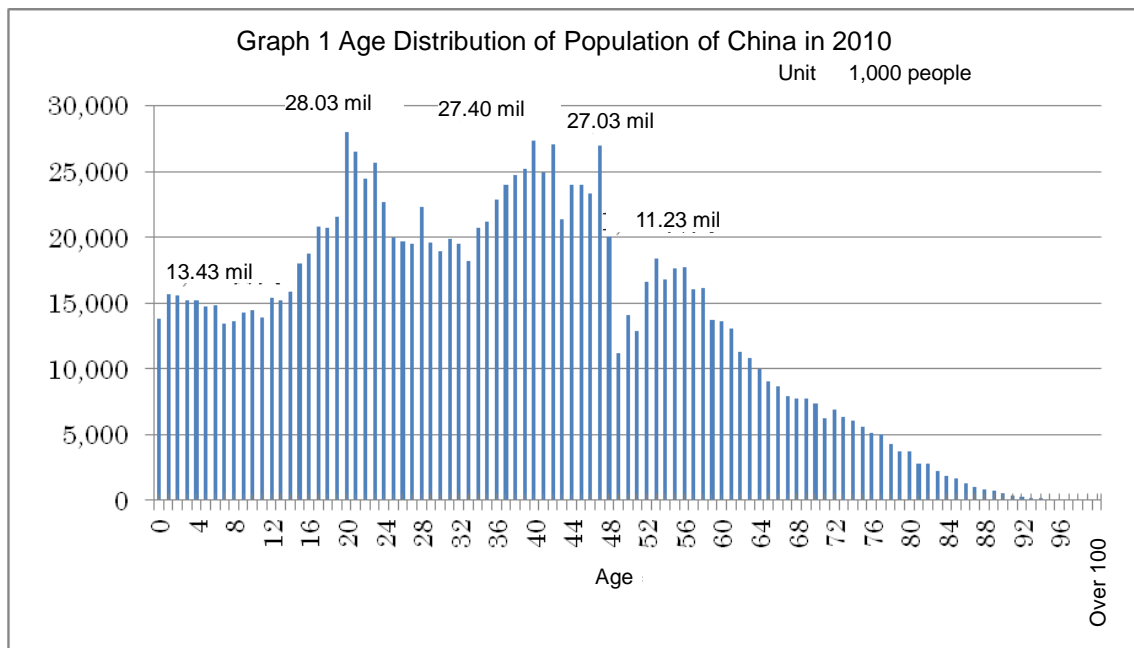
### 3. Influence of China's Population on Meat Consumption Trends and World Grain Supply and Demand

The above section discussed how the meat consumption has increased in line with the strong economic growth in China, using some data. In the near future of about five years, it becomes more apparent that China will contribute to the soaring world grain prices due to the increasing meat consumption accompanied by the increasing grain consumption.

It is, however, necessary to point out that China may enter into an ice age after a bubble burst, as experienced by Japan. It is likely for China to face a declining birth rate, as also experienced by Japan, which may possibly substantially affect the world supply and demand of meat and grains. Therefore, from a long term perspective, the increasing demands for meat and grains in China as mentioned above may not continue at the current pace. The world trends of supply and demand of grains and meat are important in efforts to seek the future of the pig farming industry in Japan, which this paper tries to clarify by focusing on China's population composition as a key point.

#### [First and Second Baby Boomers in China]

About 20 years ago, Japan experienced the economic bubble burst and the post-bubble economic slowdown, and the similar situation is beginning to exert influence on the Chinese economy. Graph 1 shows the figures reported as a result of China's Sixth National Census conducted in 2010.



Source: Created by the author based on "National Population by Sex and Age" released by the Population Census Office under the State Council

Note 1) Total population of China: 1,332.81 million

Note 2) Age of 49 to 51: born in the age of Great Leap Forward

Note 3) 1966 to 77: Great Cultural Revolution

Age of 39 to 47: 1st baby boomer

Start of reforms and open policies in December 1978

Age of 17 to 22: 2nd baby boomer

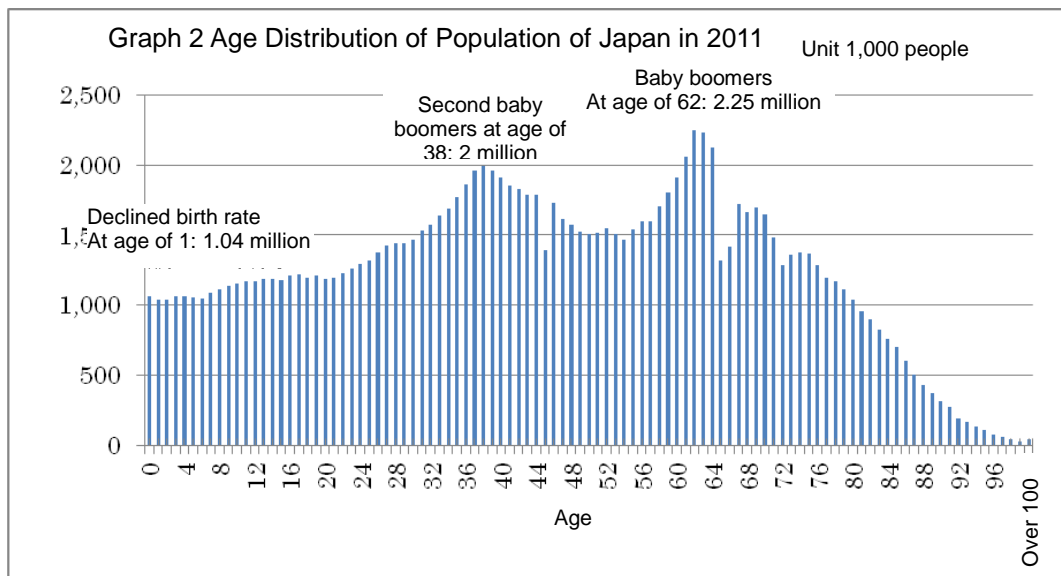
Start of the One-Child Policy in 1982

In China, persons who are 39 to 47 years old and 17 to 22 years old as of 2010 are

called first baby boomers and second baby boomers, respectively. There are more than 20 million students in each academic year. The three largest generations include people at the age of 20, 40 and 42, which consist of 28.03 million, 27.40 million and 27.03 million people, respectively. On the contrary, a small population consists of people who were born in the age of “Great Leap Forward” in which it is said that tens of millions of people died from starvation as a result of the failure in economic and agricultural operations. Another small population consists of people who were born under the One-Child Policy which is effective still now. The three smallest generations who are under the age of 60 include people at the age of 49, 51 and 7, which consist of 11.29 million, 12.84 million and 13.43 million people, respectively. These populations are less than half of the peak population.

**[China’s Current Population Composition in Common with Japan’s Population after Collapse of Economic Bubble]**

Graph 2 indicates the population composition in Japan last year. Surprisingly, this graph is similar to Graph 1 if it is moved back by 20 years. What happened 20 years ago in Japan is the collapse of bubble economy. In those years, the baby boomers were in their 40s and Second Generation baby boomers were in their late teens to early 20s, who were in the prime of their lives and had huge appetite, which largely contributed to the growth of the meat industry and the food service industry. After the bubble burst, things suddenly changes and people have experienced so-called “employment ice age” or “Lost Two Decades” which is still going on. In China, as a result of the policy to declining the birth rate, the young population continues declining, which have a substantial effect on the economy and consumption. It can be expected that the situation of China 20 years later will be quite similar to the current situation of Japan that suffers the shrinking market due to a sharp drop in the birth rate.

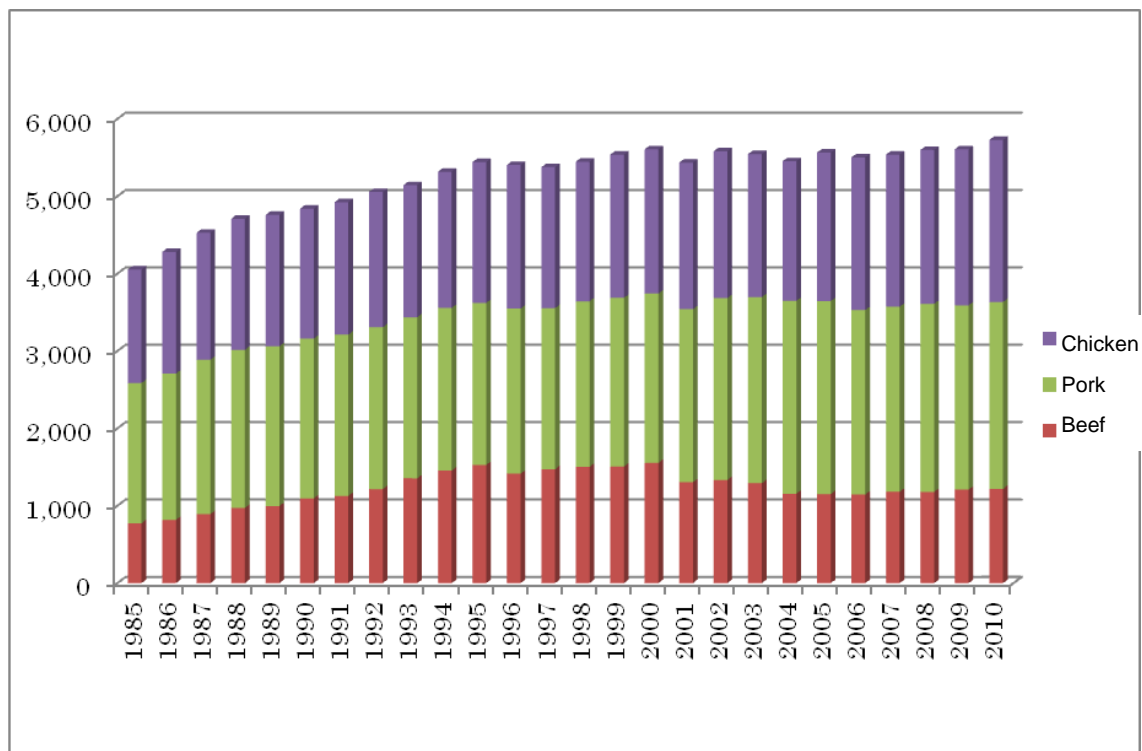


Source: Created based on the Population Census released by Statistics Bureau of the Ministry of Internal Affairs and Communications Japan’ total population as of October 1, 2011: 127.8 million

Then, the issue “how much is the meat consumption in China affected by the aging society?” is examined based on the data on historical meat consumption in Japan. It seems that China’s meat consumption will increase in the short term. In other words, the meat

consumption will constantly increase for the coming 20 years. Fig. 8 shows changes in Japan's domestic consumption of major meats such as beef, pork or chicken. As a whole, the comparison between 1990, the ending year of the bubble economy, and 2010, 20 years later, indicates that the meat consumption has been almost flat. This means that the change in the population composition (age) during the employment ice age (or "Lost Two Decades") after the bubble period had little effect on and did not decrease meat consumption in Japan. Assuming that China will follow this consumption pattern of Japan, it may be unnecessary to make an adjustment based on the population composition (age) to "Shortfall of Feed Grains" for 2030, as shown in Table 10.

**Fig. 8 Changes in Major Meat Supplies for Domestic Consumption in Japan (Unit: 1,000 tons)**



Source: Created by the author based on "Food Balance Sheet 2010" released by the Ministry of Agriculture, Forestry and Fisheries

**[Conclusion]**

China has enjoyed the real estate and stock bubble economy for these years. Needless to say, those bubbles have been driven by the industrial development as a result of the aggressive pursuit of foreign investment in line with the reforms and open-door policies and an increase in personal income. Another factor is said to be the increasing housing needs by the second baby boomers who have reached the marriageable age.

In China, there is a custom that "a young man who wants to get married should own a house for a bride," and this demand has pushed up the real estate prices. The housing bubble has contributed to the economic prosperity, but, in consideration of the future trend of China's declining population, the bubble economy may end before long. Anyhow, it is safe to say that the population problem and accompanying decline in consumption will gradually exert influence on the economy in China in the not long distant future.

At this turning point of economy, the Senkaku Islands dispute and the anti-Japan riot took place and some Japanese exporting companies are cautious about investment in China and others begin to consider the shift of their focus to other Asian countries in response to the extremely cold Japan-China relationship. European companies have already started narrowing their investment in China due to EU's financial troubles and have now another trouble of China risk (riot risk). The financial outflow from China is likely to be further accelerated.

Therefore, although China enjoyed the steadily growing economy so far, such growth may not be expected in the future. It is likely that the world meat and grain market prices will substantially fluctuate due to the climate change from a long term prospective, and the influence of China's economic conditions and consumer trends. This may inevitably cause a further turmoil to the markets.

Ends