

# The Pork Consumption Characteristics of Chinese Urban Residents: The Outlook for 2020

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**Abstract:** China has the highest pork consumption in the world. As incomes increase and the urbanization process accelerates, the consumption of pork by Chinese residents will continue to grow. This paper studies the proportion of the household pork consumption account and examines the use of apparent pork consumption as a bridge that links consumption and production. Based on the pork consumption of urban and rural residents from 2000 to 2012, combined with per capita income, the total population and the rate of urbanization, we can analyse China's market demand in the pork trade for 2020, which will be useful for countries who are interested in potential trade with China. The research shows two important findings: First, with the per capita income of urban residents increasing, their per capita pork consumption is also on the rise, and as increasing numbers of rural residents move to urban areas with the acceleration of urbanization in China, the urban areas will be the most important pork market in the future. Secondly, the per capita pork consumption of rural residents will still be lower than that of urban residents in 2020, so there will be more room for growth in pork consumption in rural areas.

**Key words:** Meat, consumption, rural and urban, forecast, 2020.

## 1. Introduction

Pork is one of the main sources of protein intake for Chinese residents, and it plays an important role in increasing farmers' incomes, enriching residents' "baskets", providing human nutrition and improving people's dietary structure. The Chinese per capita apparent consumption\* of pork was 40.74 kg in 2013, a 27.83 per cent increase compared with levels from 2000. The average annual growth rate was 2.01 per cent from 2000 to 2013. As incomes rise, the Chinese consumption of meat will continue to increase in the future, but the income elasticity of meat consumption will decline, and declines in the income elasticity of

pork consumption are especially more pronounced [1-3].

With the improvement in the income levels of urban residents and the accelerated pace of life and work, as well as the rapid development of the catering industry, consumption patterns have undergone major changes. The away-from-home food consumption of urban residents has increased rapidly, accounting for an increasing proportion of food expenditures, especially in some large and medium-sized cities. Away-from-home food consumption has become an important part of food consumption that cannot be ignored [4, 5]; a household food consumption survey in six cities in China found that with the increase in income levels and lifestyle changes, the proportion of away-from-home meat consumption of urban and rural residents has been increasing rapidly. Per capita away-from-home meat consumption accounted for approximately 30 per cent of the total meat consumption in urban households. The failure to

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\* The data regarding the total Chinese population, the quantity of national pork production and the quantity of net imports of pork are from the China Statistical Yearbook. The per capita apparent consumption of pork = (the quantity of national pork production + the quantity of net imports of pork)/China's total population.

consider the proportion of away-from-home consumption leads, to some extent, to an underestimation of China's meat consumption [6, 7]. However, with the improvement in income levels, the income elasticity of away-from-home food consumption is also declining. This means that the proportion of away-from-home food consumption in the future cannot exhibit linear growth, and food consumption at home will always occupy the dominant position.

Overall, income is a very relevant factor affecting China's per capita pork consumption [2, 3, 5, 8], and away-from-home pork consumption has become an important issue for urban and rural residents. There are different features of pork consumption in China's urban and rural areas, so predicting the future pork consumption trends in China requires work on both the urban and rural levels. The forecast about China's pork consumption comes from the urban and rural household survey data of the National Bureau of Statistics of the People's Republic of China [9], and there are two aspects that can be improved. First of all, not considering the away-from-home pork consumption may result in an underestimation of future levels of pork consumption in China. Secondly, pork consumption forecast results do not directly reflect the amount of demand for pork production. Mainly because of large significant differences between Chinese pork consumption and production data, the consumption data and the production data are difficult to match. This is mainly because the objects of these two statistics are different. The pork production statistics reflect pigs slaughtered and carcass yield, and pork consumption in urban and rural household statistics are related to the cut pork products and processed products that urban and rural households buy. There are losses in some aspects when pork comes from production to be consumed, so the numbers for pork consumption are much smaller than those for production.

By using apparent consumption, a common

indicator used by the FAO, many developed countries and Chinese Taiwan can avoid the deficiencies noted above. An examination of the index of apparent consumption projections from three major institutions, namely, the USDA 2011 baseline projections (<http://www.ers.usda.gov/data/internationalbaseline/sutabs11.htm>), the OECD-FAO agricultural outlook (<http://stats.oecd.org/index.aspx>) [10], and the FAPRI international agricultural outlook (<http://www.fapri.iastate.edu/tools/outlook.aspx>), reveals that all of them forecast that China's per capita apparent pork consumption will continue to increase and will reach approximately 43-48 kg by 2020\*. However, the differences between Chinese urban and rural consumption are so huge that it is difficult to use a single apparent consumption data set to predict the future trends of pork consumption in China.

Thus, this paper uses data that come from household pork consumption and apparent pork consumption. By using historical data analysis to reveal quantitative conversion relationships between pork consumption and pork production, not only can we predict the pork consumption trends of urban and rural residents separately, but we also can convert the forecast results into apparent consumption. By combining this with China's current annual production capacity for pork, we can analyse China's market demand in the pork trade in 2020, which will be useful for countries who are interested in potential trade in China's pork market.

## 2. Methodology

### 2.1 Data Processing and the Research Method

In this paper, we used the survey data from the NBS on urban and rural household food consumption for home consumption. The proportion of away-from-home pork consumption is the same as the

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\* The forecast data for the Chinese per capita apparent pork consumption are from the OECD-FAO, the USDA, and the FAPRI, with forecasts of 43.1 Kg, 44.3 Kg and 47.8 Kg, respectively.

proportion of away-from-home food expenditures in total expenditures [11]. We took that information and calculated the total per capita pork consumption for each year in the urban and rural areas of China. It should be noted that since 1999, the NBS no longer records data for away-from-home food expenditures in the rural areas of China. So, according to the available data, away-from-home food expenditures accounted for five per cent of the total expenditures in rural households in 1998. We assume that the growth rates of the proportion of away-from-home food consumption in rural areas are the same as the growth rates in urban areas from 2000 to 2012, and then we calculate the proportion of away-from-home pork consumption in rural areas in China from 2000 to 2012.

With the prediction method, first, we predict the per capita income of urban and rural residents in 2020, according to the income growth rate of urban and rural residents from 2003 to 2014. Taking into account that the government abolished the agricultural tax in 2003 in China, the paper analyses the growth of Chinese household income since 2003. Then, we compared the income data of the urban (rural) residents in 2020 with the income of the previous high income group of urban (rural) residents, to find which high income group's income will be the closest to the income of urban (rural) residents in 2020.

Second, we found the pork consumption data of the corresponding high income group of urban and rural residents to predict the per capita pork consumption of urban and rural residents, respectively, in 2020.

Finally, this paper combines the total population and predicted urbanization rate to predict the total quantity of household pork consumption and uses the quantitative relationship between the amounts of household pork consumption and apparent pork consumption to predict the total quantity of apparent pork consumption in China.

## *2.2 Household Pork Consumption and Apparent Pork Consumption from 2008 to 2012*

The results of the analysis show that the pork consumption of Chinese urban and rural residents was on the rise from 2008 to 2012. The per capita home pork consumption of urban and rural residents increased from 19.26 kg and 12.65 kg to 21.23 kg and 14.40 kg, respectively, and the urban and rural percentages of away-from-home pork consumption reached 21.77 per cent and 13.83 per cent in 2012, respectively (Table 1). The proportion of total household pork consumption accounting for total apparent pork consumption is relatively stable, with an average of 56.63 per cent.

According to the statistics of the Ministry of Agriculture, Forestry and Fisheries of Japan (<http://www.maff.go.jp/j/tokei/kouhyou/zyukyu/>), the portion of inedible meat accounted for 34.2 per cent of total production in Japan in 2012. Taking into account the differences between Chinese and Japanese meat consumption habits (e.g., organs and other parts of a hog that are included in the weight of the carcass, which are parts of a hog that are considered inedible in Japan, but are considered edible in China), the proportion of inedible meat in China is five per cent lower than in Japan, with an average of 29.2 per cent. In addition, there are losses affected by economics, technology and other factors in the process of circulation, processing, retail, and other sectors. According to the research results of the FAO [12], the rate of meat loss is 14.5 per cent in the process from production to consumption.

Based on the calculation above, pork loses 43.7 per cent of its content in the process from production to consumption. This proportion is basically the same as the proportion of total household pork consumption, accounting for total apparent pork consumption (56.63 per cent).

**Table 1 Per capita and total quantity of household pork consumption of urban and rural residents from 2008 to 2013.**

		2008	2009	2010	2011	2012
Urban	Per capita home pork consumption (Kg)	19.26	20.50	20.73	20.63	21.23
	Percentage of away-from-home expenditure (per cent)	20.61	21.79	21.21	21.49	21.77
	Per capita total pork consumption(Kg)	24.26	26.21	26.31	26.28	27.14
	Amount of people(million)	624.03	645.12	669.78	690.79	711.82
Rural	Per capita home pork consumption (Kg)	12.65	13.96	14.40	14.42	14.40
	Percentage of away-from-home expenditure(per cent)	13.10 <sup>a</sup>	13.85	13.49	13.66	13.84
	Per capita total pork consumption (Kg)	14.56	16.21	16.64	16.70	16.71
	Amount of people(million)	703.99	689.38	671.13	656.56	642.22
Total quantity of household pork consumption (million tons)		25.53	28.26	28.96	29.28	30.22
Total quantity of apparent pork consumption (million tons)		46.50	48.97	50.80	50.99	53.88
Proportion of total household pork consumption account for total apparent pork consumption (per cent)		54.90	57.73	57.01	57.43	56.08

a According to the National Statistics Bulletin of the NBS in 2009: "The per capita away-from-home food expenditure of rural residents was 64 Yuan in 2000, and it grew to 2009 Yuan in 2008, the percentage of away-from-home food expenditure grew from 7.8% in 2000 up to 13.1% in 2012".

Note: 1. The quantity of household pork consumption of urban and rural residents equals the per capita away-from-home and home pork consumption multiplied by the total population of urban and rural areas, respectively; 2. The quantity of household pork consumption=home pork consumption/(1-the percentage of away-from-home expenditure); 3. The quantity of apparent pork consumption equals pork production plus the quantity of net imports of pork into China.

Source: China Statistical Yearbook (2009-2013) and UN Comtrade Database.

### 2.3 Pork Consumption Characteristics of Chinese Urban and Rural Residents from 2000 to 2012

The per capita home and away-from-home pork consumption increased for both urban and rural residents from 2000 to 2012, although there were some differences in the rate of growth of both groups (Fig. 1).

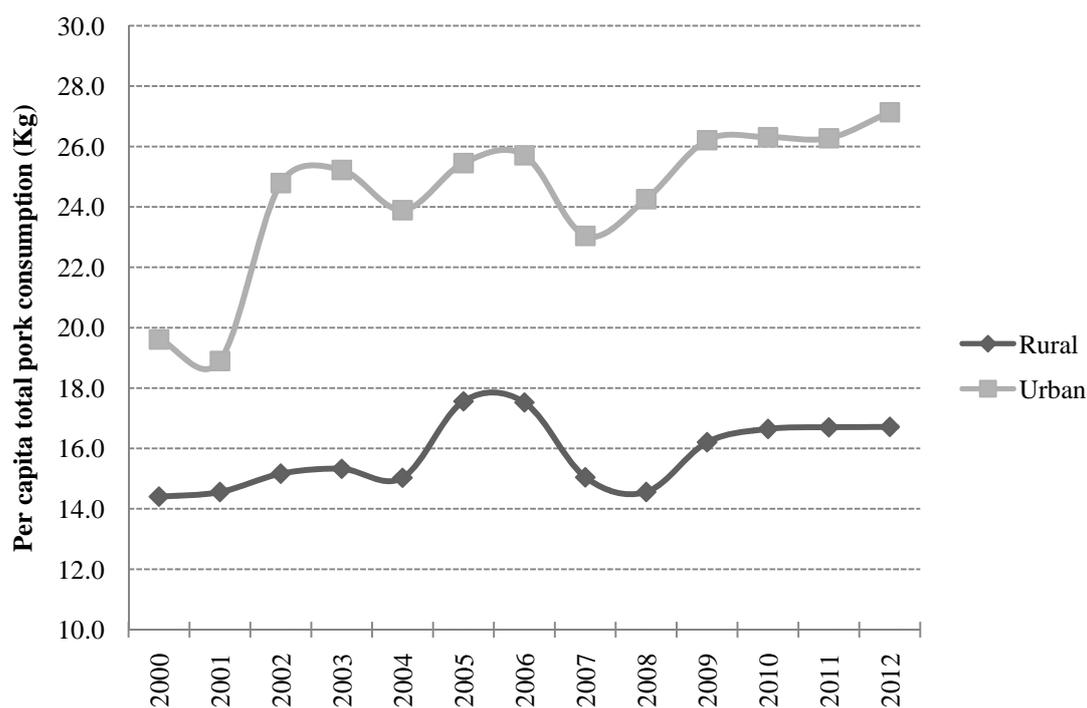
Overall, the per capita home and away-from-home pork consumption of Chinese urban residents has been on the rise since 2000. Although the per capita home and away-from-home pork consumption of Chinese urban residents suddenly fell to 23.04 kg because of higher pork prices in 2007, it has risen every year since 2008. The per capita home and away-from-home pork consumption of Chinese rural residents reached its maximum in 2006, and then fell from 2007 until 2008 because of higher pork prices. Although the per capita home and away-from-home pork consumption of Chinese rural residents has grown since 2009, it has not exceeded the level of 2006.

With the accelerated process of urbanization in China, a large number of rural labourers are moving to cities

and towns every year. The population of rural residents was 808,370,000 in 2000, and the number declined to 642,220,000 in 2012. At the same time, the population of urban residents was on the rise from 459,060,000 in 2000 to 711,820,000 in 2012, as shown in Fig. 2.

In the process of urbanization in China, the quantity of pork consumption by urban residents exceeded that of the rural residents in 2002. The quantity of pork consumption by urban residents reached 19,317,000.3 tons in 2012, while the quantity of pork consumption by rural residents was 10,733,000.3 tons in 2012.

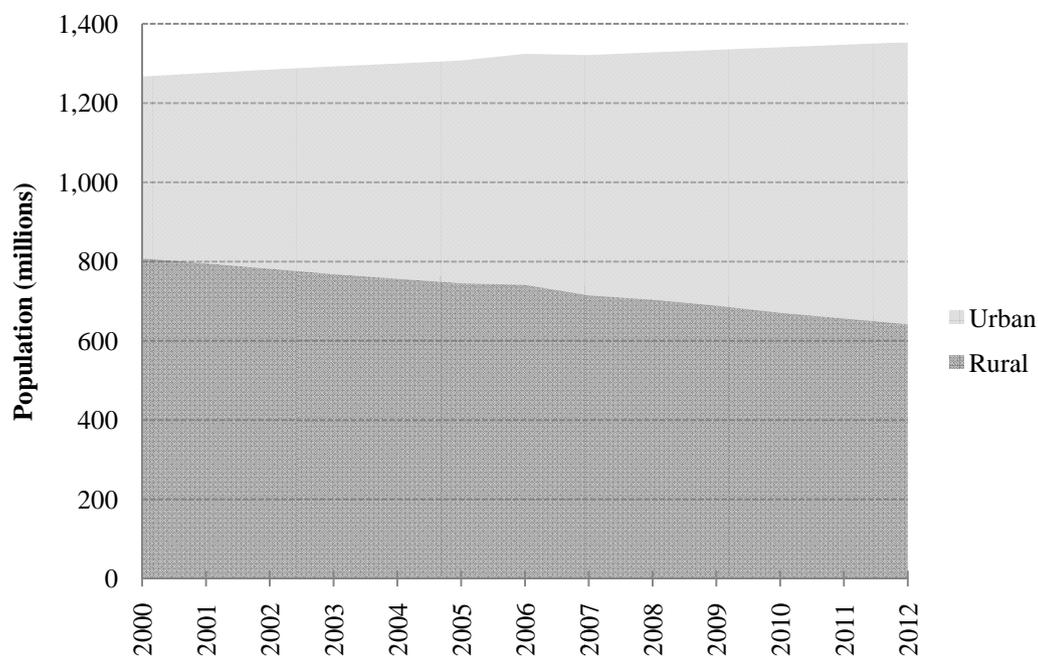
Overall, the quantity of pork consumption by urban residents has been on the rise since 2000, while the quantity of pork consumption by rural residents remained stable from 2007 to 2012, but the average quantity of pork consumption by rural residents in these years is still lower than the levels of 2006. The average growth rate of the quantity of pork consumption by urban residents was 4.16 per cent from 2005 to 2008, while the average growth rate of the quantity of pork consumption by urban residents was 6.34 per cent from 2009 to 2012 (Fig. 3).



**Fig. 1 Per capita total pork consumption of Chinese urban and rural residents, 2000-2012.**

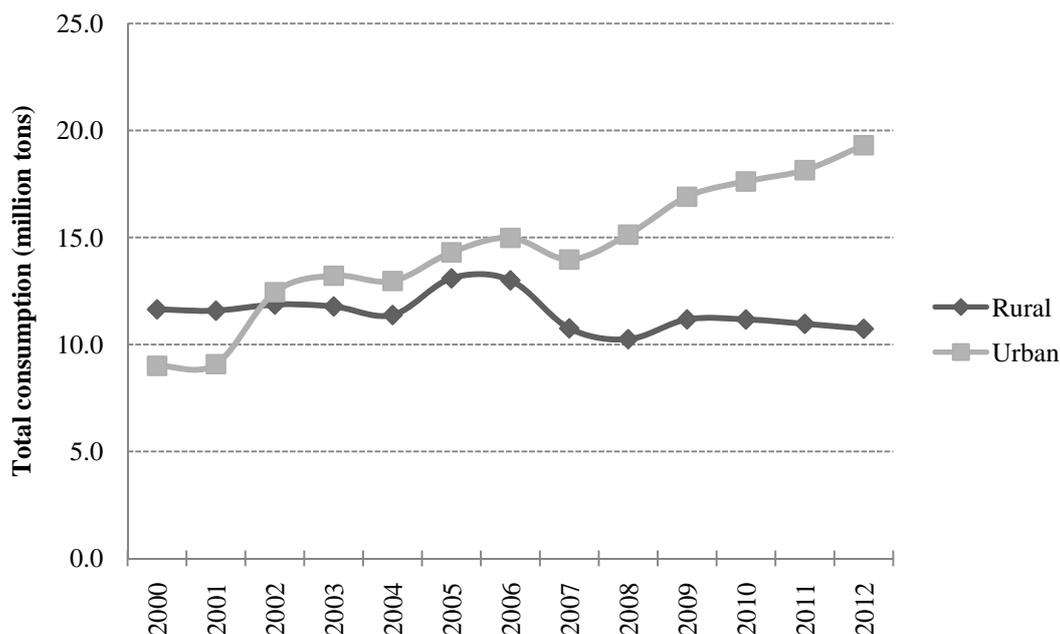
Note: The quantity of pork consumption includes the home and away-from-home pork consumption; the calculation method is the same as that used in Table 1.

Source: China Statistical Yearbook (2001-2013).



**Fig. 2 Population of Chinese urban and rural residents, 2000-2012.**

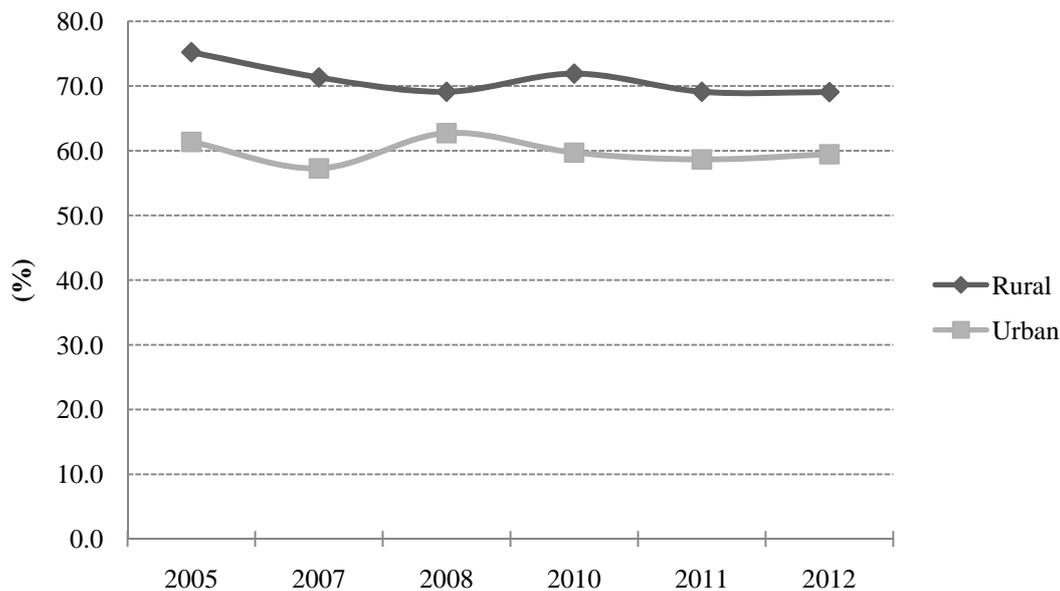
Source: China Statistical Yearbook (2001-2013).



**Fig. 3 Total annual pork consumption of Chinese urban and rural residents, 2000-2012.**

Note: The total annual pork consumption of Chinese urban and rural residents equals the per capita home and away-from-home pork consumption of urban and rural residents multiplied by the annual population of urban and rural residents, respectively.

Source: China Statistical Yearbook (2001-2013).



**Fig. 4 Percentage of pork consumption in the total meat, egg and poultry consumption of urban and rural residents in China, 2005-2012.**

Source: China Statistical Yearbook (2001-2013).

Regarding the meat consumption structure of Chinese urban and rural households, the proportion of pork consumption as part of the total meat, eggs and poultry consumption has remained stable in

recent years. The proportion of pork consumption accounted for 59.87 per cent and 70.97 per cent of consumption, respectively, from 2005 to 2012, as shown in Fig. 4.

### 3. Outlook for Chinese Pork Consumption In 2020

#### 3.1 Forecast of the Per Capita Income of Urban and Rural Residents in 2020

The average growth rate of the per capita annual income of Chinese urban and rural residents was 9.4 per cent and 9.2 per cent, respectively, from 2004 to 2013, with prices held constant at 2000 levels [9]. In 2014, the per capita annual income of Chinese urban and rural residents increased by 6.8 per cent and 9.2 per cent, respectively, compared to 2013, after deducting the price factors. In recent years, China's economy has been in the process of industrial structural adjustment, which will make economic development tend to slow down, so we assume that the growth rate of annual per capita income of Chinese urban and rural residents from 2015 to 2020 will remain the same as in 2014. The forecast results of the per capita annual income of Chinese urban and rural residents are as follows (Table 2).

#### 3.2 Forecast of the Per Capita Pork Consumption of Urban and Rural Residents for 2020

Because residents of the high-income groups of urban and rural areas in China have a demonstration effect, and per capita income is the key factor that affects per capita pork consumption [13-15], we

should find out the previous per capita pork consumption of high income groups of urban and rural residents whose per capita income is similar to that forecasted for urban and rural residents in 2020. There are five different levels of per capita income in China's Statistical Yearbook: low income, lower middle income, middle income, upper middle income and high income. By comparing the previous per capita income of urban and rural residents with the income of urban and rural residents in 2020, we find out that the per capita income of the high income group of urban residents in 2009 was the closest to the level of urban residents in 2020, and the per capita income of the high income group of rural residents in 2011 was the closest to the level of rural residents in 2020. Then, we can find the per capita pork consumption of the high income group of urban residents in 2009 and the per capita pork consumption of the high income group of rural residents in 2011, which can be considered to be the average per capita pork consumption of urban and rural residents in 2020, respectively.

According to the China Urban Life and Price Yearbook (2012) [16], we find that the per capita home pork consumption of the high income group of urban residents in 2009 was 23.27 kg, and the per capita home pork consumption of the high income group of rural residents in 2011 was 18.3 kg. With the

**Table 2 Outlook for the per capita income of Chinese residents in 2020 (Unit: Yuan).**

	Urban	Rural
Per capita income of 2013	20,088.4	6,206.6
Per capita income of 2014	21,454.4	6,777.5
Per capita income of 2020 <sup>a</sup>	31,837.9	11,492.4

a: Figure for 2020 is estimated.

Note: All the incomes are calculated according to the price in 2000.

Source: China Statistical Yearbook 2014.

**Table 3 Per capita pork consumption of urban residents in the high income group in 2009 and per capita pork consumption of rural residents in the high income group in 2011.**

	Per capita income (Yuan)	Per capita pork consumption (Kg)
High income group of urban residents in 2009	31,944.4	32.19
High income group of rural residents in 2011	12,338.1	23.04

Note: The per capita pork consumption includes home and away-from-home pork consumption.

Source: Authors.

**Table 4 Forecast of quantity of pork consumption of urban and rural residents in 2020.**

	Urban	Rural	Total
Population (million)	845.44	563.63	1,409.07
Per capita pork consumption (Kg)	32.19	23.04	–
Total consumption (million tons)	27.21	12.99	40.20

Note: The data in this Table are estimated.

Source: Authors.

**Table 5 Forecast of apparent pork consumption, pork production and net imports in 2020.**

Item	Pork
1 Quantity of consumption in 2020 (million tons)	40.20
2 Proportion of total household pork consumption accounting for the total apparent pork consumption, 2008-2012 (per cent)	56.63
3 Apparent pork consumption (million tons)	70.99
4 Per capita apparent pork consumption (Kg)	50.37
5 Quantity of pork production (million tons)	60.96
6 <sup>a</sup> Quantity of net imports (million tons)	10.03

a ⑥=③-⑤.

Note: The data in this Table are estimated.

Source: Authors.

per capita income growth, the percentage of away-from-home food expenditures has also been on the rise. Considering that the average growth rates of the percentage of away-from-home food expenditures of urban and rural residents were 3.47 per cent and 5.09 per cent, respectively, from 2000 to 2012, we assume that the growth rate of away-from-home food expenditures of urban and rural residents will remain the same from 2013 to 2020, so we can calculate that the percentage of away-from-home food expenditures of urban and rural residents will reach 27.70 per cent and 20.59 per cent, respectively. The per capita pork consumption of the high income group of urban residents in 2009 will reach 32.19 kg, and the per capita pork consumption of the high income group of rural residents in 2009 will reach 23.04 kg. The results mean that the per capita pork consumption of urban and rural residents in 2020 will be 32.19 kg and 23.04 kg, respectively, as shown in Table 3.

### 3.3 Estimated Total Quantity of Pork Consumption in 2020

The average growth rate of the population from 2000 to 2013 was 0.5 per cent. The urbanization rate

increased by one per cent per year. In accordance with this pace of development, the population of China will reach 1,409,066,000 in 2020, and the rate of urbanization will reach 60 per cent. Using the forecast of the per capita pork consumption of urban and rural residents, we can calculate the total quantity of pork consumption in China in 2020 (Table 4).

According to the average proportion of the total household pork consumption accounted for in the total apparent pork consumption from 2008 to 2013, which we had calculated as 56.63 per cent, we can deduce that the quantity of apparent pork consumption will reach 70,988,000 tons. According to the China Statistical Yearbook, the annual growth rate of pork production was 2.5 per cent from 2000 to 2013. The annual growth rate of pork production in China will be 1.5 per cent from 2013 to 2022 according to the forecast of the OECD and the FAO (2015). Based on this rate of growth, the pork production of China will reach 60,964,000 tons in 2020. The apparent pork consumption will reach 70,990,000 tons, the per capita apparent pork consumption will reach 50.37 kg, and the net pork imports will be 10,027,000 tons in 2020 (Table 5).

#### 4. Discussion and Conclusions

Through the above analysis, we can draw the following conclusions: First of all, the pork consumption of urban and rural residents accounts for the higher proportion of meat, eggs and poultry consumption. With the diversity of different meat products that Chinese residents can choose, such as beef, mutton and poultry, which can be substitutes for pork in daily life, although the proportion of pork consumption in meat consumption showed a slight downward trend, we believe that pork consumption as a proportion of meat production has little space to decline and is expected to remain stable or increase. Second, with the per capita income of urban residents increasing, the per capita pork consumption of urban residents is also on the rise at the same time, and the most important factor is that more and more rural residents have been moving to urban areas in recent years with the acceleration of urbanization in China. Therefore, we should pay more attention to the urban pork market in the future. Third, the per capita pork consumption of rural residents will still be lower than the level of urban residents in 2020, so there will still be more room for growth in pork consumption in rural areas.

However, the results of this forecast could be affected by two variables. The first variable is demographics. According to the sixth census of 2010, the population older than 60 years old accounts for 13.26 per cent of the national population. Aging in the population over the next two to three decades will be more serious, and the aging population will dramatically affect meat consumption [17]. In addition, the abolition of the single-child policy in November 2015 will definitely affect meat consumption, since many families are expected to have a second child in the coming years, and their household consumption will increase. The other variable is the proportion of household pork consumption accounting for apparent pork consumption. With continued improvements in the logistics and technology of processing, the rate of

pork losses in the process of production, processing, distribution, etc. will decline in the future, and the proportion of household pork consumption accounting for apparent pork consumption will increase. This means that the same amount of pork consumption will require less pork production. Based on these two factors, the forecast of apparent pork consumption of China in 2020 may be higher than the true situation.

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