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Editorial

Meat consumption in China and its impact on international food security: Status quo, trends, and policies

1. Background

China has seen drastic nutrition transition and food structure change with rapid economic growth in the past three decades. Specifically, the traditional fibre-dominated food system is being replaced by a western-style meat-dominated diet (Yu and Abler 2009; Tian and Yu 2013). In traditional China meat was regarded as a rarity and normally consumed during festivals, now it has become daily food for most Chinese consumers. Though many controversies have been uncovered in meat statistics in China (Yu and Abler 2014), an increasing trend of meat consumption has been observed. According to the Food Balance Sheet Statistics of the Food and Agriculture Organization (FAO), per capita meat supply in China increased from 10.3 kg in 1978 to 56.6 kg in 2011. However, the current level of per capita meat consumption in China is still relatively low in comparison to western developed countries, e.g., 87.9 kg for German and 117.6 kg for U.S. consumers.

In China the domestic meat industry is heavily hinged to consumer welfare, farmer welfare, nutritional status, agricultural trade, food security, and environmental issues. Chinese governments spend a lot of resources promoting animal husbandry in China. Given the sheer size of the population, Chinese consumers moving up the food chain inevitably shakes worldwide food security in an era of globalization. The whole world is keeping a close eye on meat consumption in China, and wants to see to what extent China could shift the world food market. Though China herself endeavors to maintain a high level of food self-sufficiency, large exporters, such as U.S. and Australia, are expecting China to further open its bulky meat and animal feed market, and are dreaming of great business opportunities there. However, low income countries, such as sub-Saharan African countries, worry that the increasing demand from China will push up world food prices and drive more of their people to fall into poverty.

Though some literature has shed light on meat consumption and its impact intentionally (e.g., Yu and Abler 2014), or unintentionally by food analysis in China (e.g., Yu and Abler 2009; Chen *et al.* 2015; Zhou *et al*. 2015), there is a call for updating and synthesizing research with a special focus on this topic. In response, we organized this special focus to look at status quo, trends, and policies of meat industries in China, and its impact on international food security.

2. Main findings

Though many related questions are important and interesting, this special focus consists of 14 research papers, providing frontier research on the following topics: (1) consumption; (2) production; (3) trade; (4) prices for meat products; and (5) food safety and the international experiences. In addition, two import policy-related issues, meat statistics and environmental sustainability of meat consumption, are intensively discussed as well.

The main findings of this special focus are summarized in the following section.

2.1. Consumption

The central question which concerns the whole world regarding meat economics in China is to what level Chinese consumers will increase meat consumption in the future. The prevalent parameters modeling consumer behavior are the consumption elasticities (including price elasticity and income elasticity). They are also used for projection. In the long run, income (expenditure) elasticities are particularly important, because they can well capture the consumption

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dynamics with income changes. Chen *et al.* (2015) provide a meta analysis for food demand elasticities in China. They find that income elasticities are very similar for red meat (pork, beef and mutton), all around 0.60, while poultry income elasticity is slightly higher at about 0.85.

In order to show the dynamic of expenditure elasticities, Burggraf *et al.* (2015) use the CHNS survey data to estimate meat elasticities in China between 1997 and 2009. They find that unconditional expenditure elasticity for meat stayed at around 1.0 and did not change much during this period (except for a slight decrease for pork products), which indicates that meat consumption in China will keep increasing in the near future with income growth. In 2009, the expenditure elasticities for pork, beef, mutton and poultry are 0.88, 1.04, 1.64 and 0.67, respectively. Burggraf *et al.* (2015) also compare meat consumption in China with that in Russia, and indicate that in 2008/2009 meat is still a luxury good in China, but a necessity good in Russia. Income growth in China and Russia tends to increase the demand for animal-based products much stronger than the demand for carbohydrates.

The current research did not provide much information about meat consumed from home, which often biases the estimation of meat consumption as well as elasticities. Min *et al*. (2015) use a unique household survey data and find that currently food away from home (FAFH) accounts for 30% of meat consumption for urban households in China. Similarly, Xiao *et al.* (2015) find that both consumption at home and FAFH are underestimated in the official statistics of NBSC. Particularly, they find that in 2010 FAFH accounts for 45% meat consumption in urban areas and for 20% in rural areas.

As income increases, consumers often pay more attention to quality attributes, in addition to quantity growth (Yu and Abler 2009). The share of FAFH meat consumption is expected to increase with further income growth, as rich consumers are more likely to purchase the service embedded in restaurant and ready-to-eat food. Ignoring this part of consumption in a demand analysis will bias down income (expenditure) elasticities (Min *et al.* 2015).

In addition, it is well known that China is experiencing a demographical change, stepping into an ageing society. Without considering the demographical change, the projection of meat consumption using the current elasticities will be biased. Min *et al.* (2015) find that meat consumption in households with old people is often lower due to health concerns. Considering the demographical change, meat consumption growth in the future will not be as large as the usual elasticities predicted. Rather, per capita meat consumption could shrink in about ten years.

Food safety is a major concern for Chinese consumers due to recent food safety scandals in China. To ensure food safety for consumers the government in China developed a unique certification system, which divides food safety into three levels. From the least to most stringent, they respectively are Safe Food, Green Food, and Organic Food Certifications (Yu *et al*. 2014a). Yu *et al*. (2014a, b) indicate that rich consumers are more likely to pay more for premium food, such as “Green Food” and “Organic Food”. For instance, Chinese consumers are willing to pay 40% more for Green Pork and 60% more for Organic Pork. However, the trust in certifications is still a major problem.

Over consumption of meat products could cause some diet-related diseases, such as obesity, type 2 diabetes, cardiovascular diseases, hypertension, and cancers (Shimokwa 2015). To a certain point, consumers then tend to change dietary habits towards a more healthy diet. In western society, such as in Germany, there is a recent movement to vegetarianism, calling for more vegetable consumption. From the 1980s, per capita meat consumption in Germany has dropped by more than 10%, from the peak of 96.7 kg in 1986 to 87.9 kg in 2011. Such a movement, I think, will come to China, and affect consumer behaviors in China in the near future.

In addition, Dong *et al*. (2015) using a partial equilibrium model, and Yu and Cao (2015) using a general equilibrium (GTAP) project meat consumption in the future. Their results are similar, and find that per capita consumption of meat products in China will continue to rise until 2030.

2.2. Production

Pork is the main meat consumed by the Chinese. Though the proportion of pork in total meat consumption has been steadily declining since the 1980s, it is still more than 60%. In this special focus, there are two papers which focus on pork production in China, contributed by Tian *et al.* (2015) and Zhou *et al.* (2015); and one paper on environmental issues related to production, contributed by Abler (2015).

Although the traditional backyard pig farms are shrinking and large scale pig farms are booming instead, around half of pork in China is still produced by small-scale backyard farms. According to the estimation by Yu and Abler (2014), the proportion of backyard pig production was 85% in 1991, and the number has dropped to 48% in 2009.

Tian *et al.* (2015) investigates the productivity and efficiency of hog production and the determinants of technical efficiency in China, using the fixed-point rural household survey data (2004–2010) from the Research Centre of Rural Economy (RCRE). They use a stochastic frontier translog production function with scaling property in inefficiency term, and find that the average technical efficiency of hog production in China is 0.59. More importantly, large and specialized farmers have higher technical efficiency than others, and