Food Consumption Dynamics in China: The Case of Beef [1]

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Abstract

As a large developing country, China has experienced rapid economic growth in the two decades. With the increase of consumer income, food consumption has become greatly diversified. Such changes have more implications for policy makers and for food marketers. Beef as a meat product is slowly gaining ground relative to the more traditional pork products. A small percentage change in China's beef consumption could lead to a dramatic impact on international trade in beef and feed grains.

This paper has concentrated on factors affecting beef purchasing decisions in China. Using probit regression analysis, the effect was estimated of socioeconomic and demographic characteristics, together with other influences on preferences as they affect beef purchasing decisions. Data were collected from two separate consumer surveys – one urban and one rural. This permitted better estimation of overall trends and comparison between urban and rural consumer preferences for beef.

Key words: Beef, Perception, Chinese consumer

1. Introduction

The People's Republic of China has experienced rapid economic growth over the last two decades. With subsequent rise of personal income levels, there have been great changes in food consumption by Chinese consumers. For example, during the two decades between 1981 and 2002, direct consumption of food grains at the national level has dropped by 7% in rural areas and 45% in urban areas (SSB). On the other hand, the consumption of meat, eggs, and aquatic products in rural areas has increased by 85%, 278%, and 222%, respectively. For urban areas, the increases are 29%, 113% and 69%, respectively (SSB). In meat products, beef is slowly gaining ground relative to the more traditional pork products. What happens in Chinese food demand is of great interest to international agricultural and food businesses and Chinese policy makers.

Chinese food consumption is of great importance to market explorations and strategic business planning for various industries both in and outside China. The newly emerging changes in consumer preference and the introduction of Western ideas about beef consumption may require higher quality beef. The quantities, variety, and quality specifications for beef and their likely changes in the future are crucial to those who are involved in long-term livestock industry planning (Wang, Zhou and Cox 2004).

It is imperative for the policy makers to have a better understanding of the current food consumption change and its likely trends in the future when they are making

decisions on nutrition planning and managing meat supply (Tian 2003). For a large developing country such as China, due to the sheer size of its population, changes in food have even much greater implications, not only for the country itself but also for the rest of the world (Brown 1994). It is believed that there is considerable latitude for food consumption growth in China and China will become one of the fastest-growing markets for food products in the coming years, due to its high prospective rates of economic growth (Wu 1999, p. 24). Beef as a relatively new meat product, has changed the population's diet to some extent with the development of the Chinese government's 'straw for beef' project (Tian 2003).

The recent Chinese beef consumption will have a great impact on world beef trade. On the one hand, if China chooses to import more beef directly from other countries, simply because of the huge volume demanded, it would change world beef trade patterns. On the other hand, if China chooses to produce beef itself, the relationship between beef consumption and production will decide the level of China's participation in the world beef market.

In addition, the development of domestic beef production, which is stimulated by the increasing beef consumption in China, would require more feed grains. An increase in feed grains production will lead to a decrease in food grains production as China's land resources are quite limited, and vice versa. China may import either more food grains or feed grains, if beef consumption rises. The quantity of grains consumed by the Chinese has been a great food security concern for the Chinese government; this also may be a major factor influencing world grain trade, which may impact the price of grain and the income of grain farmers both in China and overseas. Thus, the development of the Chinese livestock industry is likely to have a great influence on world grain trade (Tian 2003). Subsequently, the changes of Chinese beef consumption have also attracted the attention of international dealers in this trade.

Given the sheer size of the Chinese food market, a small percentage change in China's food consumption have important implications for the agri-food industries not only for China but also for many other countries that have an interest in supplying to the Chinese market. The recent developments in China's food consumption have attracted much attention from researchers. However, despite the efforts of earlier studies, there are still some issues and questions that remain untouched or unanswered. This paper is to focus on examining the rising consumption of beef in China. The remainder of the paper is organized into five sections. The next section contains a review of literature that is followed by sections describing the methodology, and results and discussion. The last section contains implications of the study.

2. Review of literature

During the transitional period of the last two decades, substantial research was carried out on various issues of the Chinese economy. In the initial stage, China's national

food security had been a topic of interest to both politicians and academics (Brown 1995). Later, research topics focused on more diversified subjects, such as household consumption patterns (Fan et al. 1995; Gao et al. 1996; Wu 1999), market development (Huang 1998), food demand (Halbrendt et al. 1994; Huang 2001) and animal product consumption (Zhou and Tian 2004; Wang, Zhou and Cox 2004; Bean and Zhang 2005). A number of factors can cause changes in household consumption. They can be economic, social, cultural, and market development that makes new foods available. Among these factors, income is seen to be the most influential. Studies revealed that levels of income did affect the composition of food consumption (Regmi et al. 2001; Jones et al. 2003), and meat consumption growth in China was closely linked to rises in consumer incomes (Lewis and Andrew 1989; Fan, Wailes and Cramer 1995; Huang 1999; Wang, Zhou and Cox 2004, Ma et al. 2006).

Longworth, Brown and Waldron (2001, p. 298) believed that the consumption of ruminant meat in China was greater the higher the level of income. They also found that there was a strong seasonal pattern in consumption of beef and beef offal in China, so that throughput being greater in winter than other times of year. Hu (2000) identified the gender imbalance in beef consumption. He explained it as a Chinese belief that beef was a hot and aggressive food which is good for males according to the Chinese traditional medicine theory. Wang, Zhou and Cox (2004) indicated a significant gap of animal products consumption between urban and rural regions of China. Zhang (2002) showed that higher variety-seeking consumers tend to be younger, better educated and more affluent. In a report on consumer behaviour towards meat in Germany, Becker et al. (1998) pointed that meat consumption was expected to decline with age. It has been remarked in the literature that differences in consumer decision making and changes in age may impact on age-related lifestyle, taste and preference patterns (Burton et al. 1994, 1996).

Jarvis and Wilcox (1973) extensively discussed evoked set, which investigates consumer decision behaviour when confronted with choices of alternative goods or services. They justified this method of analysis above various other theoretical frameworks by addressing the importance of a consumer's experience, socioeconomic background and preferences in purchasing decisions. The empirical results also supported the use of the method. Foltz, Dasgupta and Devadoss (1999) applied this method to investigate consumer purchasing behaviour towards trout products in US. They gave insight into consumer demand for trout products by investigating consumer perceptions of trout and explaining their purchasing decisions from the standpoint of their socioeconomic /demographic background, rural/urban experiences and personal preferences.

However, after the two decades of economic expansion, a temporary surplus supply of agricultural products has come in China (Zhang 2002). In addition, the Chinese consumer's role and position have become increasingly more important as living standards have improved. Consumer research related to China includes analyses of

consumers' purchasing behaviour (Samuel et al. 1996), segmentation of consumers' food consumption patterns (Veeck et al. 2000), and consumer's dietary pattern (Chen 1995) and the cultural issues (Shono et al. 2000; Zhang 2002). All the studies provide general information about Chinese food consumption issues, till now, little attention had been paide to investigate the consumer's perception towards a specific food item, such as beef, which is important for business planning and policy making. This paper attempts to contribute to the literature on the consumer perceptions and purchasing behaviour towards beef as a food item in the Chinese market.

3. Methods of analysis

The purpose of the study was to provide a better understanding of consumer purchasing behaviour towards beef in the Chinese market. In accordance with this purpose, data were collected and analysed to investigate consumer attitudes towards beef. Theoretical and empirical studies of consumer behaviour suggested that a consumer's socio-economic and demographic characteristics affect beliefs, which in conjunction with product attributes, impact product perceptions (Engle and Kouka 1995; Foltz, Dasgupta and Devadoss 1999). Socio-economic factors, rural and urban experience, product attributes and marketing methods employed by sellers have a certain impact on purchasing behaviour (Engle and Kouka, 1995; Nauman et al. 1995). Hence, regarding to our survey, the respondents were required to recall their beef consumption and other issues during previous week.

Probit regression is an approach to handling categorical dependent variables, which is based rational choice perspective on behaviour (Green 2002). Probit modelling is used for explaining discrete choice in home beef consumption. Probit model consists of observable independent variables and unknown parameters, and their values are estimated from a sample of observed choices made by decision makers when they confronted with a choice situation. Two types of dependent variables were developed in the analysis: binary choice variables and multi-choice variables. Accordingly, binary choice model and multi-choice model were used to explain these two types of variables, respectively.

3.1 Binary choice model (Probit)

Binary choice variables indicate whether a consumer wants to buy a product or not.
Assumptions:
1. Variable=1 the consumer wants to buy beef product
2. Variable=0 the consumer does not want to buy beef product
3. Error term ε in the regression of latent dependent variable follows a standard normal distribution.
The probability that a binary choice variable (y1) =1, a consumer is willing to buy beef is given by: P [consumer i wants to buy beef] = $\phi(\beta X_i)$

Where β is a (k×1) vector of regression coefficients;

X_i is a (k×1) vector of k regressors for the ith consumer; and

ϕ denotes the standard normal cumulative distribution function (CDF)

Independent variables are shown in Table 2. Given a sample of n observations, a likelihood function can be developed from the above design and maximized with respect to β in order to obtain the maximum likelihood estimates (MLE) $\hat{\beta}$.

3.2 Multi-choice model (Ordered probit)

Multi-choice variables give different degrees of willingness to purchase products. The multi-choice variables are developed from survey questions in which respondents had the opportunity to indicate on a Likert scale to indicate how often (often buy, sometimes buy, rarely buy or never buy) they buy the beef product. An Ordered probit model is conceptualised around a regression

$$Y^* = \gamma X + \varepsilon$$

Y^* denotes an unobserved dependent variable, that is determined by explanatory variables.

γ is a (k×1) vector of regression coefficients;

X is a (k×1) vector of k regressors for the ith consumer; and
ε is a standard Normal error term.

4. Data

Information about consumer perceptions of beef and consumption data was obtained through a consumer survey in the winter of 2005 in China. The questionnaire contained questions on the weekly frequency of beef consumption, its market outlets, purchase behaviour, product perceptions regarding different attributes, and some questions about other meats consumed in China. The questionnaire was first designed in English and discussed intensively with different sector experts and consumer researchers. It was then translated into Chinese. The translated questionnaires were pre-tested. Consumers from different age, sex and income categories were asked to answer the questions and then give their comments on the content and design of the questionnaire. Valuable comments were received concerning the length and the structure of the questionnaire to make it more concise and friendlier. Based on these feedbacks, some products, such as duck and fish were deleted; the questionnaire was restructured and finalized for the survey.

A stratified data collection method was applied to draw samples. One-thousand

questionnaires were sent out, of which 340 were completed and valid, resulting in a response rate of 34%. A sample of 340 is sufficient to ensure validity in this kind of exploratory study. Jiangsu, Shandong, Liaoning, Sichuan and Inner Mongolia province were chosen to form our urban samples, and Jiangsu, Liaoning and Inner Mongolia province were chosen to form our rural samples. The sample size of each province was exceeded 30 enable us to draw small-sample conclusions effectively. We do not claim that our sample represents all the consumers of selected area, due to the constraints of the time and budget.

Respondents differed considerably in age, education, income and ethnic group. Demographic characteristics of the sampled consumers, disaggregated by urban and rural residents, are reported in Table 1. Compared with the *2005 Chinese bulletin of 1% population census* of several variables, the Han Chinese in our sample accounts for 92.9%; it is 90.6% according to the 1% population census. Moreover, the average household size is 3.03 and 3.13 respectively in our survey and in 1%population census, indicating that our sample data are quite representative.

Table 1. Demographic Characteristic of the Surveyed Consumers

	Survey sample		
	Urban	Rural	All
Average household size	3.06	3	3.03
Average age of decision maker	45	44.6	44
Maximum (minimum) age	79 (22)	77(20)	79(20)
Education level of decision makers (% of the samples)			
Less than primary school	10.78	33.33	17.94
Middle school graduate	17.24	42.59	25.29
High school graduate	32.33	24.07	29.71
College graduate	38.79	0	26.47
Advanced degree	0.86	0	0.59
Ethnic group			
Han Chinese	93.5	91.7	92.9
Non-Han Chinese	6.5	8.33	7.06
Annual family income			
Less than 6000	2.16	28.7	10.59
RMB6000-10000	3.02	28.7	11.18
RMB10001-20000	21.98	26.85	23.53
RMB20001-30000	28.45	9.26	22.35
More than RMB 30001	44.4	6.48	32.35
Total number of the observations	232	108	340

Table 2 contains definitions of independent variables used in regression models that were developed from the survey questionnaire. The regressors were classified into three categories that were assumed to explain consumer perceptions: a consumer's socio-economic/demographic background, urban and rural experience and personal preferences. The regressor selection procedure in each model was based on choosing

variables from each of the three categories that maximized a regression model's Likelihood Ratio Index (Green 2002).

Table 2. Categories and Definitions of Independent Variables Used in the Regression Models

Socio-economic Category	
Age	Decision maker's age
Number of male	Number of male over 16 in survey family
Family size	Consumer's household size
Income level	Consumer's household income level
Education	Decision maker's education level
Ethnic Group	Dummy variable; 1 if consumer's ethnic group is Han Chinese
Urban / Rural Experience	
Urban / Rural	Dummy variable; 1 if consumer is in urban areas
Consumer Preferences Category	
Smell and Taste	Dummy variable; 1 if smell and taste good is important to the consumer
Freshness	Dummy variable; 1 if freshness is important to the consumer
Safety	Dummy variable; 1 if clean and safety is important to the consumer
Cooking Method	Dummy variable; 1 if cooking method is important to the consumer
Nutrition	Dummy variable; 1 if nutrition is important to the consumer
Health Concern	Dummy variable; 1 if health concern is important to the consumer
Price	Dummy variable; 1 if price of beef product is important to the consumer
Market Outlets	Dummy variable; 1 if market outlet is important to the consumer

5. Results and discussion

Descriptive results and discussion were reported first, followed by econometric results and the discussion of their meanings in the following paragraphs.

Information on the reasons for not purchasing beef both in urban and rural areas was provided Table 3. Compared to other meats, the relatively high price of beef (34%) and consumers' unfamiliarity with its cooking method (26%) are the main limitations for beef consumption. These are followed by 'don't like the taste and smell' and 'other reasons' which shows that compared with pork, beef is still relatively new to Chinese consumers and some of them are not used to the flavour of beef products.

Table 3. Reasons for not Purchasing Beef

Reasons	Percentage of respondents		
	Urban	Rural	All
Relatively expensive	33	35	34
Difficult to cook	31	17	26
Don't like the taste	17	21	18
Don't like the smell	11	16	12
Other reasons	8	11	10

The consumers' responses to the eight main attributes of beef, based on their importance of perception in urban, rural and All categories were presented in Table 4-a, Table 4-b, and Table 4-c, respectively. Most consumers rank safety and freshness as far the most important attributes for beef, followed by smell and taste, nutrition and colour. Consumers' deep concern about safety shows that China at present lacks the ability to implement quality controls; unsafe food has partly dampened the consumers' confidence. In addition, Chinese consumers prefer fresh, even live

products and enjoy the smell and taste of the foods.

According to the survey, price and 'easy to cook' appears not very important attributes among beef consumers, especially in urban areas. This is mainly because more and more consumers are inclined to eat beef away from their homes, or just buy processed beef products regardless of the higher price. It was confirmed by previous studies, that much busier life styles and rising incomes would generate markets segment for food-away-from-home and convenient foods (Veeck 2000; Ma, Huang and Rozelle 2006).

Table 4. Consumers' Attitude towards Beef Attributes

Urban

Characteristics	Importance in consumers minds			
	Very important	Important	Unimportant	Very unimportant
Safety	84	8	8	0
Freshness	82	14	4	0
Smell and taste	59	30	11	0
Nutrition	54	33	12	1
Colour	50	30	20	10
Tenderness	46	34	20	0
Price	33	40	25	1
Easy to cook	20	26	45	9

Rural

Characteristics	Importance in consumers minds			
	Very important	Important	Unimportant	Very unimportant
Safety	79	15	3	3
Freshness	74	18	4	4
Smell and taste	47	37	8	8
Nutrition	54	26	11	9
Colour	29	55	11	5
Tenderness	34	35	16	15
Price	31	43	19	7
Easy to cook	21	33	24	22

All Consumers

Characteristics	Importance in consumers minds			
	Very important	Important	Unimportant	Very unimportant
Safety	83	10	6	1
Freshness	79	15	4	2
Smell and taste	55	32	10	3
Nutrition	54	31	13	2
Colour	44	37	17	2

Tenderness	42	34	19	5
Price	33	41	23	3
Easy to cook	20	28	39	13

Table 5 indicates that both in urban and rural areas, fresh beef ranks highest (urban 26%, rural 10% and all 21%), followed by pre-cooked beef (urban 20%, rural 5% and all 15%) by beef consumers. This result is in agreement with the previous literature of Chinese consumers' preference in relation to freshness of meats (Zhang 2002). Frozen beef is the least popular type. Chilled beef is a rather new concept to Chinese consumers. It is offered mostly at supermarkets with good refrigerator facilities.

Table 5. Beef Product Preferences among Beef Consumers

Beef product	Frequency of purchase											
	Often buy			Sometimes buy			Rarely buy			Not likely to buy		
	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All
Fresh	26	10	21	34	37	35	25	33	27	15	20	17
Pre-cooked	20	5	15	33	25	31	17	27	21	30	43	34
Dried	13	3	10	30	26	29	30	27	29	27	44	32
Chilled	3	0	2	17	3	13	22	22	22	58	75	63
Frozen	1	3	2	7	1	5	27	21	25	65	75	68

The consumers' decisions on market outlets for beef product are listed in Table 6. The wet markets and supermarkets were the main market outlets for beef. Though the wet markets retained their dominant position for selling meats, the supermarket is becoming an increasingly important market outlet in urban areas as the market development brings convenient access to modern supermarkets and more consumers are aware of food safety that the supermarket can more easily guarantee. Specialty markets are not very popular for household purchases, but it is common for restaurants to purchase their material for meat dishes from this source.

Table 6. Consumers' Decisions on Market outlets

Market outlets	Frequency of purchase											
	Often			Sometimes			Rarely			Never		
	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All
Wet market	26	29	26	29	38	32	18	22	19	27	11	23
Supermarket	21	1	15	27	14	24	20	26	22	32	58	39
Specialty market	15	1	11	19	5	15	16	7	13	50	87	61

The results of a Probit regression where the dependent variable is the binary choice of purchasing beef are presented in Table 7. The LR statistic (5 df) value of 119.41 and McFadden R-squared of 0.60 indicates joint significance of all regressor coefficient estimates.

The estimated coefficient of the dummy variable of urban/rural experience has a positive and significant value of 0.779, indicating that there is difference between urban and rural consumers, with respondents in rural areas less inclined to purchase

beef. The positive sign for ethnic groups shows the Han Chinese are more ready to accept beef than Non-Han Chinese. The estimated coefficients of the two dummy variables for 'safety' and 'easy to prepare' outline the characteristics of the beef buyers who regards safety and ease of preparation as important criteria in purchasing decisions. The estimated coefficient of income has a positive sign at just below the 10% significant level. This is suggestive of beef consumption increasing with income.

Table 7. Probit Regression Results with Dependent Binary Variable

Independent variable	**Coefficient**
Intercept	-3.549*
Urban/Rural	0.779*
Income	0.257*
Ethnic groups	1.657*
Safety	3.256*
Easy to prepare	0.920*

Note: McFadden R-squared=0.60, LR statistic (5 df) =119.41, Probability (LR stat) =0.00 implying joint significance of all regressor coefficient estimates.
'*' Signifies that the estimated coefficient is significantly different from zero with α=10%.

Results from an Ordered Probit regression where the dependent variable represents four degrees of frequency of consuming beef are shown in Table 8. The LR index value of 0.198 indicates joint significance of all regressor coefficient estimates.

Table 8. Ordered Probit Regression Results Explaining Consumer Beef Consuming Frequency

Regressor	**Coefficient estimate**
Urban/Rural	0.397*
Family size	-0.272*
Number of Male over 16	0.597*
Income	0.216*
Age	-0.027*
Education	0.134*
Safety	1.614*
Price	-0.309*
Easy to prepare	-0.323*
μ_1	0.952*
μ_2	2.645*

Note: LR index (Pseudo-R2) = 0.198, LR statistic (9 df) =164.49, Log likelihood = -332.359, and Restr. log likelihood = -414.606 implying joint significance of all regressor coefficient estimates.
'*' Signifies that the estimated coefficient is significantly different from zero with α=10%.

Like the result of Binary Probit regression, the estimated coefficient of the dummy variable of urban/rural experience from Ordered Probit regression also shows urban residents are more inclined to consume beef. The results from Ordered Probit regression tell us more about the target consumers by the negative sign of family size which indicates the bigger the family is, the less probability to consume beef. It is because on the one hand it is hard to coordinate different tastes in a big family, and on the other hand it costs more than other meats to a big family, as we had mentioned before that beef was relatively expensive. The regression results also indicate that the

number of males who are above 16 has a positive effect on beef consumption, which is in line with the previous literature that beef was regarded as male food under the Chinese cultural background. The positive sign of income estimate discloses that the increase of income stimulates higher beef consumption consistent with the proportion of meat in household diets rises with income by Ma et al. (2006). The negative effect of age on beef consumption supports Burton (1994) and Becker et al. (1998)'s conclusion that meat consumption is expected to decline with age. Education has a positive influence on beef eating, for higher education may enrich the nutrition knowledge by identifying beef as a nutritious food item and good for health. The remaining regressors in Table 8 are dummy variables of importance of 'safety', 'price' and 'easy to prepare', which have statistically significant coefficient estimates (at α=5% level) implying they are important criteria of their decision making process determining a higher likelihood of frequently of consuming beef and beef products.

According to the regression results, the characteristics of target consumers who show a preference towards beef are: residents of urban areas, a smaller family or a family with more males over 16 years old, the young (below 45 years old) and well educated, possessing a good income and who considered safety, price and ease of preparation as important purchasing criteria.

Several results from this study are consistent with conclusions drawn from other related studies (Burton et al. 1994, 1996; Becker et al. 1998; Wang, Zhou and Cox 2004). The regression results exhibit a big gap on beef consumption between urban and rural China, as Wang, Zhou and Cox (2004) had identified. our results also indicate that age has a negative effect on beef consumption in China, confirming a similar conclusion of meat consumption's decline with age by Becker et al. (1998) and Burton et al. (1994, 1996). The portrait of male target consumers drawn according to the survey results supported Hu's (2000) discovery of gender imbalance in beef consumption.

Conclusions

This study gives an insight into consumer demand for beef products by investigating consumer perceptions of beef and explaining their purchasing decisions from the standpoint of their socio-economic/demographic background, rural/urban experiences and personal preferences. It also draws significant conclusions regarding characteristics associated with consumers that show a tendency toward purchasing beef. Such information provides valuable basis for developing efficient marketing strategies and equipping the sellers with ideas for beef products for which there is a potential high demand.

Several key findings were obtained from the survey data. First, a large segment of consumers purchase beef because they perceive that it is good for their health, due to its nutritional value. Second, pre-cooked beef is in higher demand according to our

survey. Third, non-buyers dislike beef because of its relatively high price and lack of product and preparation information. Hence, an initial step to increasing consumer demand for beef would require disseminating positive information about beef products to persuade them that it is worth buying and developing recipes that give variety to the methods of beef preparation, focus should be on recipes that are good for health and relatively easy to prepare.

Several marketing implications of these results are as follows: first, currently, beef sellers should focus on urban areas. Second, it is much easier for the sellers market beef in communities with a large proportion of Han Chinese, for our results show that the Han Chinese are more ready to accept beef than Non-Han Chinese. Last, advertising campaigns should highlight the healthiness of beef. Such advertisements could also feature beef as being good for women and children because it is rich in iron.

There are several limitations for our survey. As Longworth, Brown and Waldron (2001, p. 300) pointed out, the strong seasonal pattern in beef consumption may lead to inflation in predicting the situation for the whole year. Our survey was carried in winter. In addition, small DFS may affect the reliability of the result. Further research needs to study the beef consumption issues related to consumption away from home, for it is becoming a more important part of Chinese food consumption, especially in urban areas. Further research could elaborate on the pattern and determinants of the beef consumed away from home.

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