Consumers' attitude towards meat brands: Evidence from pork products in Guangzhou, China

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ABSTRACT

This study aims to investigate the factors influencing consumers' cognitive attitude towards the brands of products during their consumption willingness, behaviors and choices. Taking pork brands as an example, this study conducts a questionnaire by using a random sampling method in 165 farmers' meat markets and 54 supermarkets in Tianhe District, Yuexiu District, Liwan District, the representative districts in Guangzhou city in China, and obtains 1,050 valid observations of the pork consumers. The empirical results via a logit regression show that the factors significantly enhance consumers' brand cognitive attitude include younger age; lower perception of product safety; less cognition of green food, frailer awareness of fresh, cold, and frozen meats, as well as weaker ability to identify a specific product. Also, stronger consumers' brand attitude results from larger amount of money spent in a single purchase, stronger cognition of nuisance-free food, and higher identification of different types of pork meats.

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1. Introduction

Pork is one of the leading products in China's livestock husbandry industry and also one of the main sources of meat consumption for urban and rural residents in the country. In 2020, China's pork production attained 52.96 million tons, accounting for approximately 59.6% of the total domestic meat production (Liang et al., 2022). Pork consumption in China was 36.40 million tons in 2020, which accounted for more than 38% of total pork consumption in the world. Additionally, pork is an important imported product. In 2020, China's imported pork accounted for nearly 48.35% of the global imported pork.[1]

Given the importance of the pork industry in China, the Chinese government has attached increasing attention to it and has implemented preferential policies such as providing subsidies for pig farmers (Wu et al., 2016). Yet, the domestic pork industry has suffered from a series of problems related to poor hygiene and chemical contamination (Cheng and Yin, 2012), which not only constantly challenge existing eating habits, but also influence the international pork industry. Specifically, with the improvement of living standards, people's dietary pursuits are also changed. Thus, consumers' demand for better quality food, which affects demand for pork consumption (Hu, 2023), and the health and safety of Chinese consumers and has an association with quality and safety of the Chinese pork market and the global pork market, especially in Asia and even European (Wu et al., 2015). Accordingly, pork products become a focal point of Chinese government to actualize safety and quality of pork market and then investigation of consumers' attitude towards pork products is of great significance in China.

In order to meet the needs of consumers, pork suppliers have created branded pork originating from non-chemical treatments and 'green' pigs whose production process should meet nuisance-free food standards, green food standards, veterinary drug use standards, veterinary epidemic prevention standards, literacy management standards, and environmental health standards issued by the state or the agricultural sector including regulation of animal slaughter, processing, storage and transport only after strict inspection and quarantine. Stakeholders set up brands for pork products and obtain a price premium by distinguishing it in the market from chemically treated pork. Thus, it is practical to pay attention to Chinese consumers' attitude towards pork brands.

Economic globalization and the continuous improvement of the technology of agro-products has led to an ever-increasing number and variety of agro-products, leading to a shift in the supply-demand relationship of agro-products and an oversupply of product variety or quantity among various regions. Competition in the market for agro-products has shifted from simple price competition to complex brand competition. Branding agro-products is a bridge between agricultural producers and consumers, which can play a crucial role in increasing product value and consumer loyalty (Rahnama et al., 2012) and help a product stand out in a competitive environment (Datta, 2003; Kotler, 1997). Consumers are the final point of the chain link in the whole agro-product industry. Their attitudes towards brands for agro-products and their willingness to consume a particular product determines the value of the entire food market and has a profound impact on government policies and decisions made by food businesses. Moreover, this study is of high relevance and great significance within the broader literature on branding in the agricultural sector and acts as an important supplement in consumers' attitude towards brands of agro-products (Hu & Zhang et al., 2023). Therefore, understanding consumer brand attitudes of Chinese pork consumers and the factors influencing it is of great practical significance for understanding the buying behavior of pork consumers, meeting their preferences regarding pork consumption, and promoting the development of consumer-oriented pork brand enterprises. Yet, it is still a research gap to address consumers' attitude towards pork brands in China.

This study conducts an in-depth analysis of pork consumers in three core areas of Guangzhou City based on

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[1] The data is from United States Department of Agriculture and is available at the website
https://apps.fas.usda.gov/psdonline/circulars/livestock_poultry.pdf.

the degree of importance they assign to a brand. In-depth study of consumer cognitive attitudes on pork brands and factors influencing their pork brand attitudes are of great significance to strengthen the safety of the market and the competitiveness of the pork industry chain. Guangzhou, located in south-east China, is one of the three largest cities in the country, with a population of 15 million people. Together with the neighboring cities of Foshan, Dongguan, Shenzhen and Zhongshan and Shenzhen, it forms one of the world's largest urban agglomerations.

In order to perform an embedded analysis of consumer cognitive attitudes on pork brands and determinants of their pork brand attitudes, the specific goals of this study are threefold: 1) to investigate consumers' cognitive attitude towards the brands of products on their consumption willingness, behaviors and choices; 2) to help entrepreneurs to establish new brand for meat products; 3) to construct a safer market and sustain a competitive pork industry chain.

2. Materials and methods

2.1. Study area and sample selection

This study selected three areas in Guangzhou city: Tianhe District, Yuexiu District, and Liwan District (Hu & Hu et al., 2023). Tianhe District is located in the east of Guangzhou City, with the total administrative area of 137.38 square kilometers. According to the seventh census data, Tianhe District has a permanent resident population of 2,241,826 people, as of midnight on November 1,2020. In 2022, Tianhe District's GDP (GDP) reached 621.572 billion RMB yuan, an increase of 2.4% over the previous year.

Yuexiu District is the central urban area of Guangzhou City. The land area is 31.29 Square kilometer. In 2021, Yuexiu District had a registered residence population of 1.1745 million. In 2022, Yuexiu District's Gross regional product will be 3650.18 billion yuan, up 0.1% over the previous year.

Liwan District is one of the old urban areas of Guangzhou. It is located in the west of Guangzhou and south of the Tropic of Cancer. The total area is 59.1 Square kilometer. In 2021, there were 1.1296 million permanent residents in Liwan District. In 2022, Liwan District will achieve a Gross regional product of 121.557 billion yuan.

On the basis of the above statement, we chose Tianhe District, Yuexiu District, and Liwan District as our sampling areas due to that they represent the larger population, broader area and higher economic level of interest, and they have been acclaimed as the most core districts in Guangzhou.

To ensure the coverage and representativeness of the samples, we adopted the following steps: First, we calculated the sampling size in each sampling place (*i.e.*, the farmers' meat market and supermarket) weighted by the population in the district and we got an interval, more than or equal to 3 and less than or equal to 6 for each sampling place. The sampling weights were calculated by the areas of these three districts, *i.e.*, 60.32% (Tianhe District), 13.74% (Yuexiu District) and 25.95% (Liwan Districts). Weighted by the area of each district, the sampling sizes were 100 farmers' meat markets and 33 supermarkets for Tianhe District, 23 farmers' meat markets and 7 supermarkets for Yuexiu District, 43 farmers' meat markets and 14 supermarkets for Liwan District, respectively. Notably, if there were more than one chain store in a sampling area, we only selected the largest one to hand out paper questionnaire. That is to say, we did not count in the chain stores which did not rank first in size in some sampling area if they affiliated to an identical supermarket. A total of 1,200 paper questionnaires were handed out across 165 farmers' meat markets and 54 supermarkets in these three districts. Second, we leveraged the method of random sampling to carry out questionnaire survey among pork purchasers, and totally 1,088 respondents were successfully interviewed, of which 1,050 were valid questionnaires. There were 785 respondents from the farmers' meat markets (74.76%) and 265 from supermarkets (25.24%).

2.2. Theoretical background and hypotheses

According to the previous research, the main factors that influence consumers' meat choices, intentions, and brand attitudes can be roughly divided into the following five aspects:

(1) Consumers' individual characteristics. The extant studies on meat choices, especially on attentions toward meat brands has pivoted on consumers' individual characteristics incorporating gender, age, education level and income levels (Balogh et al., 2016; Gaski, 2020; Hong et al., 2023; Rieger et al., 2016; Zhou et al., 2017). Accordingly, we propose Hypothesis 1 to Hypothesis 4 as follows:

H1: Male consumers have lower statistically significant impact on their attitude towards pork brands than female consumers.

H2: Younger consumers have lower statistically significant impact on their attitude towards pork brands.

H3: Consumers with higher education attainment have higher statistically significant impact on their attitude towards pork brands.

H4: Consumers with higher income have higher statistically significant impact on their attitude towards pork brands.

(2) Consumers' consumption characteristics. Most research revealed that consumers' consumption characteristics influence their attitude, willingness, and behavior, and consumers' consumption characteristics includes purchase frequency, place of purchase and money spent in single purchase (Zhou et al., 2017; Banerji et al., 2016). Additionally, another key factor is the proportion of purchase expenditure on some meat product in the total meat expenditure. From a psychological perspective, food consumption choices reflect product characteristics (Rozin et al., 1986) as well as consumers' perception of food safety and risk (Yeung and Morris, 2001). Consequently, we raise Hypothesis 5 to Hypothesis 8, *i.e.*,

H5: Consumers with larger purchase frequencies have lower statistically significant impact on their attitude towards pork brands.

H6: Consumers purchasing in supermarkets have higher statistically significant impact on their attitude towards pork brands than consumers purchasing in farmers' meat markets.

H7: Consumers spending more in single purchase have higher statistically significant impact on their attitude towards pork brands.

H8: Consumers having higher proportion of pork spending in total meat expenditure have higher statistically significant impact on their attitude towards pork brands.

(3) Consumers' risk perception. Risk perception plays an important role in consumer behavior (Yeomans-Maldonado & Patrick, 2015) and can be extended to perceived safety levels in the case of pork products (Zhou et al., 2017). Thus, we present Hypothesis 9:

H9: Consumers with higher perception of safety of pork have lower statistically significant impact on their attitude towards pork brands than consumers with lower perception of safety of pork.

(4) Consumers' knowledge. When exploring the drivers of consumers' attitude, behavior and choices, consumers' knowledge about the brands of the products, for example, the extent the consumers' knowledge and the level of product awareness, were often discussed (*e.g.*, De Jonge et al., 2004; Feldmann and Hamm, 2015; Lydia and David, 2009). Hence, we assume Hypothesis 10 to Hypothesis 16 as below:

H10: Consumers with higher awareness of green food tend to have higher attitude towards pork brands.

H11: Consumers with higher awareness of nuisance-free food tend to have higher attitude towards pork brands.

H12: Consumers with higher awareness of organic food tend to have higher attitude towards pork brands.

H13: Consumers with higher cognition of green food tend to have higher attitude towards pork brands.

H14: Consumers with higher cognition of nuisance-free food tend to have higher attitude towards pork brands.

H15: Consumers with higher cognition of organic food tend to have higher attitude towards pork brands.

H16: Consumers with higher awareness of the quality of fresh, cold, and frozen meat tend to have higher attitude towards pork brands.

(5) Consumers' product identification ability. Today, consumers in China are more willing to consume green (organic) foods, indicating changes in consumer preferences which can be attributed to increases in income and the growth of a middle-class (Yu et al., 2014). Some consumers prefer products with a safety certification

(Wongsprawmas et al., 2015) and are willing to pay more for such products (Birol et al., 2017). This highlights that consumers are paying more attention to their brands and have positive attitude towards product brands. Consumers' awareness of food safety impacts their attitude, willingness, and behavior to choose certain brands (Banerji et al., 2016; Zhou et al., 2017). While most studies on consumer products consider the identification of food properties (Banerji et al., 2016), this study focuses also on consumers' ability to determine product safety. Therefore, we set Hypothesis 17 and Hypothesis 18, specifically,

    H17: Consumers with higher ability to identify pork safety tend to have higher attitude towards pork brands.

    H18: Consumers with higher identify pork meat types tend to have higher attitude towards pork brands.

    According to the theoretical background and the proposed hypotheses, we established a theoretical conceptual framework for this study. More detailed information is shown in the below Figure 1 and the expected signs of the corresponding variables are listed in Table 1.
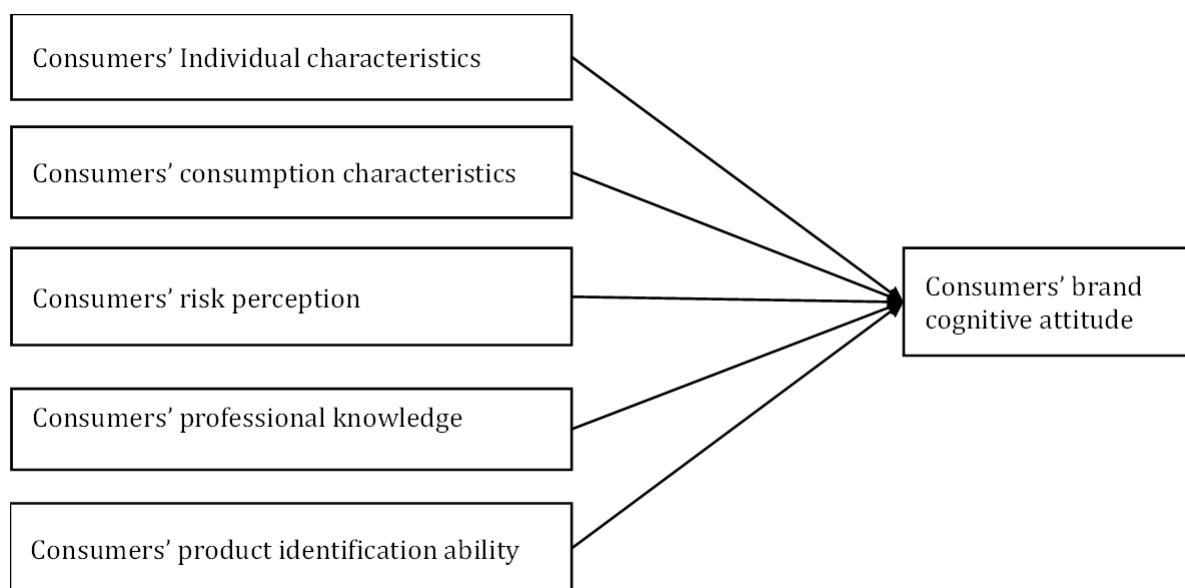
Figure 1. The theoretical conceptual framework.

Table 1. The expected signs of the theoretical conceptual framework.

Variable		Expected signs
Consumers' Individual characteristics	Gender	-
	Age	-
	Education level	+
	Average household income	+
Consumers' consumption characteristics	Pork purchase frequency	+
	Place of purchase	+
	Money spent in single purchase	+
	Proportion of pork expenditure in total meat expenditure	+
Consumers' risk perception	Perceived safety of pork	+
Consumers' professional knowledge	Awareness of green food	+
	Cognition of green food	+
	Awareness of nuisance-free food	+
	Cognition of nuisance-free food	+
	Awareness of organic food	+
	Cognition of organic food	+
	Awareness of quality of fresh, cold, and frozen	+
Consumers' product identification ability	Ability to identify pork safety	+
	Ability to identify pork meat types	+

2.3. Variables

The dependent variable is consumers' attitude towards pork brands, and we reference the measurement developed by Kleih et al. (2023) and hence based on the answer from the question: "Using a score from 1 (low) to 10 (high) for brand indicate how important they are", define consumers' attitude towards pork brands as: 0=consumer does not attach importance to pork brands; 1=consumer attaches importance to pork brands.

According to the theoretical basis, this study adopts the following variables for the model, including 1) the dependent variable, consumers' attitude towards pork brands; 2) the dependent variables, *i.e.*, consumers' individual characteristics (gender, age, education level, and average household income), pork consumption characteristics (pork purchase frequency, place of purchase, money spent in single purchase, proportion of pork expenditure in total meat expenditure), risk perception regarding pork products (awareness of green food, cognition of green food, awareness of nuisance-free food, cognition of nuisance-free food, awareness of organic food, cognition of organic food, and awareness of quality of fresh, cold, and frozen), level of knowledge about pork, ability to identify pork products (ability to identify pork safety, and ability to identify pork meat types). A total of 18 variables are used as explanatory variables to construct the theoretical research model, and more details of theses 18 variables are listed in Table 2.

Table 2. Definition of modelling variables.

Variable		Definition
Consumers' brand cognitive attitude		0 = consumer does not attach importance to pork brands; 1 = consumer attaches importance to pork brands
Consumers' Individual characteristics	Gender	1 = Male; 2 = Female
	Age	1 = Less than 30 years old; 2 = 30–39 years old; 3 = 40–49 years old; 4 = 50–59 years old; 5 = 60 years and above
	Education level	0 = illiterate; 1 = primary school; 2 = junior high school; 3 = high school/secondary school; 4 = college; 5 = undergraduate and above
	Average household income	1 = 3,000 RMB and below; 2 = 3,001–5,000 RMB; 3 = 5,001–7,000 RMB; 4 = 7,001–9,000 RMB; 5 = 9,001–11,000 RMB; 6 = 11,001–20,000 RMB; 7 = more than 20,000 RMB
Consumers' consumption characteristics	Pork purchase frequency	1 = once a day; 2 = once in two days; 3 = once in three days; 4 = once in four days; 5 = once in five days; 6 = rarely
	Place of purchase	1 = farmers' market; 2 = supermarket
	Money spent in single purchase	1 = 10 RMB; 2 = 10–20 RMB; 3 = 20–30 RMB; 4 = 30–40 RMB; 5 = 40 RMB or more
	Proportion of pork expenditure in total meat expenditure	1 = 90% or more; 2 = 70–90%; 3 = 50–70%; 4 = 30–50%; 5 = 10–30%; 6 = 10% or less
Consumers' risk perception	Perceived safety of pork	1 = very low; 2 = relatively low; 3 = general; 4 = relatively high; 5 = very high
Consumers' professional knowledge	Awareness of green food [a]	Did you know about green food? 0 = No; 1 = Yes
	Cognition of green food	If 10 points indicate that you know a great deal about green food and 0 indicates that you do not know, how much do you know about green food?
	Awareness of nuisance-free food	Did you know about nuisance-free food? 0 = No; 1 = Yes
	Cognition of nuisance-free food	If 10 points indicate that you know a great deal about nuisance-free food and 0 indicates that you do not know, how much do you know about nuisance-free food?
	Awareness of organic food	Did you know about organic food? 0 = No; 1 = Yes
	Cognition of organic food	If 10 points indicate that you know a great deal about organic food and 0 indicates that you do not know, how much do you know about Organic Food?
	Awareness of quality of fresh, cold, and frozen	0 = does not know the best quality of hot meat; 1 = knows the best quality of hot meat
Consumers' product identification ability	Ability to identify pork safety	1 = It is difficult to identify; 2 = Generally not; 3 = Maybe, generally; 4 = In most cases; 5 = Can be fully
	Ability to identify pork meat types	1 = can distinguish one type; 2 = can distinguish between two types; 3 = can distinguish between three types; 4 = can distinguish between the four types; 5 = can distinguish between five types; 6 = can distinguish between 6 types; 7 = can distinguish between seven types; 8 = can distinguish between eight types; 9 = can distinguish between nine types; 10 = can distinguish between 10 types

Notes: a. Green food: similar to Organic Food but with less stringent conditions; refers to the agricultural products grown in a non-polluting ecological environment and with full standardized production or processing. In addition, green food needs to be certified by specialized agencies, and its standards are certified and evaluated by the Ministry of Agriculture in the development of Green Food in China. b. Nuisance-free food: the use of pesticides and fertilizers is allowed in the production process, but not allowed to exceed national standards; there are no strict restrictions on hormones, antibiotics, and transgenic technology requirements. c. Organic food: refers to the organic agricultural production system, according to international organic agricultural production requirements and the standard production

and processing, through an independent organic food certification system, such as the International Organic Agriculture Movement Alliance (FOAM) certified food. The organic production process is very strict, i.e., the use of chemical fertilizers, pesticides, antibiotics, hormones and transgenic technology is strictly prohibited. Organic Food may be more nutritious and healthier than other food.

2.4. Statistical analysis

This study focuses on consumers' attitude towards pork brands, that is, whether a consumer considers brand on his or her purchase choice. Consumers' brand attitude being a dichotomous variable, a binary logistic regression model is considered as the most appropriate model to deal with the disordered binary selection problem (Garson2006). The simple logistic regression model is as follows:

$$Y_i = X_i + u_i \tag{1}$$

where Y_i is the dependent variable and only takes the values 0 and 1; Y_i = 1 means that consumers attach importance to pork brands; while Y_i = 0 means consumers do not attach importance to pork brands, the corresponding probability is p_1 and p_0. X_i is an independent variable, μ is a random error term that follows the binomial distribution of $b(p_1(1 - p_1))$. So, we can obtain the following equation:

$$P_1(Y_i = 1) = P(Y_i^* > 0) = P(u_i^* > -X_i\beta) = 1 - F(-X_i\beta) \tag{2}$$

The probability distribution function of the binomial distribution is:

$$F(t) = 1/ \ (1 + e^{-t}) \tag{3}$$

The value range of F(t) is [0,1], then we obtain equation (4) by combining formulae (1), (2) and (3).

$$P_1 = 1 - 1/ \ (1 + e^{X_i\beta}) \tag{4}$$

Then the model for consumers' brand attitude is constructed as follows based on the above analysis.

$$Log(P_1/P_0) = X_i\beta \tag{5}$$

where P_1/P_0 is the odds ratio, X_i denotes consumers' individual characteristics, consumption characteristics, risk perception, professional knowledge, and their product identification ability.

3. Results

3.1. Brand attitude of pork consumers

It is found that consumer awareness about pork brands is low. A total of 46% of available brands were investigated in this study and among them, No. 1 free-range pork received the highest number of mentions (38.42%), followed by Xiangpengpeng pork, Heijiabao black free-range pork, Ankang free range pork, Shuanghui pork, Wens' pork. Second, consumption of branded pork is low. The brand adoption index revealed that only 9% of consumers purchased branded pork, and these consumers purchase their preferred brands at a farmers' meat market or supermarket or even go for a long distance to purchase their desired branded pork. By contrast, 71% consumers have never purchased (or given subjective attention to) branded pork. Third, the perceived safety of the product has a non-significant impact on Brand attitude. The analysis indicated that 78.0% consumers purchase pork based on its appearance, 17.7% check for inspection or quarantine certifications, and 15.9% trust their retailers. However, 13.4% consumers believed that people are growing increasingly concerned about product safety, suggesting that a

demonstration effect could significantly impact consumers' purchase decisions. In addition, 12.9% consider their preferred brand to be safe, indicating that for them security is a key factor influencing post-purchase experiences and thus, brand loyalty. However, for a vast majority of the consumers, brand attitude has a negligible effect on brand loyalty and safety, and some continue to purchase based on their instinct and product appearance.

A brand itself has limited impact on consumers' purchase decisions of pork. Nearly four-fifths of consumers determined the safety of pork by observing its appearance. In this case, freshness and safety are the most important factors affecting consumers' purchase decisions. Freshness can be directly inferred from appearance, whereas security is an expectation. Contrary to expectations, most buyers prioritize quality assurance over price. Only 4% consumers considered a brand to be the most important decision-making factor. Similarly, Liu Chao (2012) investigated pork consumption in Beijing and found that consumers prioritize quality, followed by price and brand.

3.2. Factors affecting brand attitude of pork consumers

We used Stata 14.0 to perform a binary logistic regression on the data. Table 3 reports model estimation results. According to the results, the likelihood ratio is−511.67 and the χ2 value is 306.97 (p = 0.0000), which indicates that the independent variables have significant explanatory ability.

Table 3. Logit regression results for pork consumer' brand attitude and influencing factors.

Variable	Coefficient	Z-value	Probability
Gender	−0.12	−0.71	0.480
Age	−0.15	−2.11	0.035**
Education level	0.07	1.34	0.180
Average household income	0.04	0.88	0.377
Purchase frequency	−0.04	−0.63	0.526
Place of purchase	0.05	0.3	0.765
Money spent in single purchase	0.28	3.46	0.001***
Proportion of pork spending in total meat expenditure	0.04	0.59	0.553
Perceived safety of pork	−0.20	−1.82	0.069*
Awareness of green food	0.09	0.28	0.778
Cognition of green food	−0.14	−2.36	0.018**
Awareness of nuisance-free food	−0.28	−0.67	0.505
Cognition of nuisance-free food	0.12	1.74	0.083*
Awareness of organic food	−0.06	−0.15	0.884
Cognition of organic food	0.04	0.54	0.588
Awareness of quality of fresh, cold, and frozen meat	−0.75	−3.52	0.000***
Ability to identify pork safety	−0.24	−2.38	0.017**
Ability to identify pork meat types	0.06	2.05	0.040**
Log likelihood		−511.67	
Wald chi² (18)		306.97	
Prob. > chi2		0	

*Notes: ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.*

The results reveal that the following significantly impact pork consumers' brand attitude: age; amount of money spent in a single purchase; perceived safety of pork product; awareness of green, nuisance-free, and organic foods; awareness of fresh, cold, and frozen meat quality; ability to identify pork safety; and ability to identify pork meat types.

First, in terms of consumers' individual characteristics, age has a significant positive impact on whether a consumer attaches importance to a brand for pork products, whereas average monthly income and gender do not

have such effect. As for age, pork purchasers are mainly concentrated between 21 and 60 years of age (88.7%); 50.4% of the total sample are purchasers aged from 31 to 50. In other words, the elderly has low brand attitude, whereas the younger consumers pay more attention to pork brands and are more inclined to purchase branded pork products. This can be attributed to the fact that most young people often pursue fashion and keep themselves informed of new trends in retailing, which strongly advocates brand names, awareness, and marketing. This approach can be extended to other brands. However, it is likely that the current young consumers will gradually age, and in the future, this may reposition the elderly as the main consumers of branded pork. Thus, the enterprises could target and engage young consumers effectively through strategies such as coupons, discounts, and member rights, or using digital payment approach (Bi et al., 2023; Hu & Zhang, 2023).

Second, to the effect of consumers' consumption characteristics, only the amount of money spent in a single purchase has a significant positive impact on whether a consumer attaches importance to a brand. On the other hand, frequency of purchase, place of purchase, and proportion of pork spending in total meat expenditure do not have significant impacts on pork brands. The amount of money spent in a single purchase reflects, to a certain extent, the economic and living standards of consumers. Most of the respondents spent 10–20 yuan (49.3%), followed by 20–30 yuan (20.1%) and 10 yuan (19.5%). Only 6.7% and 4.4% spent 30–40 yuan and 40 yuan respectively. A higher expenditure level in terms of a single purchase denotes that consumers have higher economic status, standard of living, and quality of life requirements, and thus they pay more attention to purchasing high-quality pork brands. Compared with ordinary pork, the price of branded pork is high, which means consumers of the latter have psychological expectations that may limit their capacity. Moreover, for higher-price consumer groups the cost of products is less of a deterrent to purchase, and therefore, such consumers are more likely to consider buying branded pork even if the prices are higher.

Third, while consumers' awareness of nuisance-free food positively impacts their attitude toward pork brand, that of green foods has a negative effect. In addition, consumers' awareness of the quality of fresh, cold, and frozen meat quality negatively affects their attitude toward pork brand, although this effect is not significant. Consumers' awareness of nuisance-free, green, and organic foods has no significant impact on consumers' attitude toward pork brand because most pork brands have access to such certifications. Moreover, it is likely that consumers have only heard about the three types of foods and do not fully understand them, thus rendering them unable to distinguish between ordinary and certified pork.

In general, consumers' awareness of green, nuisance-free, and organic foods increases their tendency to their attitude toward pork brand. However, the empirical results show that consumers' awareness of nuisance-free food positively impacts their attitude toward pork brand, that of green food has a negative impact, and consumers' recognition of organic food has no significant impact. The negative impact of green foods can be explained by a critical value assigned to consumer attitude toward pork brand. When consumers' awareness is below the critical value, this indicates that they understand green food but are not fully aware of the products. For example, free-range pork is often considered to be more nutritious; however, research on free-range pork nutrition shows that the nutrition level of free-range pork and ordinary pork is consistent, although both products are not advertised as such.

While the lack of knowledge can affect the extent of consumers' attitude toward pork brand, excessive information also exerts a significant negative effect. The survey revealed that consumers' awareness of green food is higher than the average cognitive level of 62.5%, and thus, greater than the critical level. This also means that enhancing consumers' green food awareness can have a counterproductive effect on improvement of consumers' attitude toward pork brand. In terms of nuisance-free foods, consumers' awareness positively impacted brand attention; however, 61% of consumers' awareness of nuisance-free food was below the average cognitive level. This suggests that increasing consumer awareness of nuisance-free products expands the attention they give to a brand. Finally, organic foods have no significant impact on consumers' attitude toward pork brand; however, the present

study was unable to explain this finding and thus further research is required.

Next, awareness of fresh, cold, and frozen meat quality has a significant negative impact on consumers' attitude toward pork brand, indicating that consumers who can distinguish three or more types of meat better understand their brand. The survey revealed that 93.6% of consumers of fresh, cold, and frozen meat are more informed than other consumers of the quality of fresh meat, indicating a degree of awareness considerably higher than the critical Level. In other words, any attempt to enhance consumers' awareness of quality of fresh, cold, and frozen meats to improve consumers' attitude toward pork brand could backfire. This is consistent with the findings for awareness of green foods.

Finally, consumers' ability to identify safety levels of pork products positively impacts consumers' attitude toward pork brand. To prevent consumers from purchasing low-quality pork products with low safety levels, brands should proactively provide safety information. At the same time, the lower a consumer's ability to identify the safety level of a product, the higher the cost of sourcing safer products and time spent on buying them. To simplify the process of determining safety levels, brands must consider incorporating a security logo on their products. According to the survey results, 57.2% were able to identify pork safety levels, indicating that the current consumer awareness of pork safety is higher than the critical level. Thus, enhancing brand identification to consumers' attitude toward pork brand could have adverse effects.

In general, findings on the ability to distinguish between different types of pork meat suggest that consumers have a strong identification ability and a high overall level of consumers' attitude toward pork brand. Moreover, consumers of ordinary pork are more likely to buy branded pork products in the future if they develop a deeper understanding of the brands. The survey results indicated that 69.4% of consumers' average ability to distinguish pork meat types is lower than the critical level. From this, it can be concluded consumers' attitude toward pork brand can be improved by enhancing their meat identification ability.

To sum up, Table 4 reports the results of the hypotheses for this study clearly.

Table 4. The results of hypotheses for this study.

Variables	Hypotheses	Expected signs	Real signs	Significant or not for real signs	Confirm or not
Gender	H1	-	-	Yes	Not
Age	H2	-	-	Yes	Yes
Education level	H3	+	+	Yes	Not
Average household income	H4	+	+	Yes	Not
Pork purchase frequency	H5	+	-	Not	Not
Place of purchase	H6	+	+	Yes	Not
Money spent in single purchase	H7	+	+	Yes	Yes
Proportion of pork expenditure in total meat expenditure	H8	+	+	Yes	Not
Perceived safety of pork	H9	+	-	Not	Yes
Awareness of green food	H10	+	+	Yes	Not
Cognition of green food	H11	+	-	Not	Yes
Awareness of nuisance-free food	H12	+	-	Not	Not
Cognition of nuisance-free food	H13	+	+	Yes	Yes
Awareness of organic food	H14	+	-	Not	Not
Cognition of organic food	H15	+	+	Yes	Not
Awareness of quality of fresh, cold, and frozen	H16	+	-	Not	Yes
Ability to identify pork safety	H17	+	-	Not	Yes
Ability to identify pork meat types	H18	+	+	Yes	Yes

4. Discussions

From the above analysis, we can see that consumers' attitudes towards pork brands is low and more than half of the pork brands in the market remain unknown to consumers. Consumers' low brand attitude towards pork may be explained as the following aspects. On the other hand, consumers' own perspective might be another factor. Brands may have a limited impact on consumers' decisions regarding purchases of pork products. Most of the consumers might believe appearance, freshness, and safety, but not the brand itself, are the most important factors influencing pork purchase decisions.

Further study reveals the factors influencing consumers' brand attitude towards pork:

First, consumers' age has a significant positive impact on whether they attach importance to a brand. More specifically, younger consumers are more likely purchase branded pork products. The findings are consistent with the previous studies like Balogh et al. (2016), Gaski (2020), Hong et al. (2023), Rieger et al. (2016) and Zhou et al. (2017).

Second, the total amount of money spent in a single purchase has a direct positive impact on consumers' brand attitude, which is consistent with the existing finding by Zhou et al. (2017) and Banerji et al. (2016).

Third, consumers' risk perception negatively impacts brand attitude, that is, the higher the risk perception, the lower the consumers' attention towards the pork brands. Because the consumers with higher risk perception are always risk aversive. The conclusion is accordance with the finding from Yeomans-Maldonado and Patrick (2015), and Zhou et al. (2017).

Fourth, consumers' awareness of nuisance-free food positively impacts consumers' brand attitude; in other words, higher awareness of nuisance-free would lead to greater brand attitude. However, consumers' awareness of green food negatively affects consumers' brand attitude; in other words, higher awareness of green food tends to result in greater brand attitude. The study results are partially consistent with De Jonge et al. (2004), Feldmann and Hamm (2015), as well as Lydia and David (2009).

Fifth, consumers' awareness of the quality of fresh, cold, and frozen meats has a significant negative impact on whether consumers assign importance to brands: that is, the higher the cognition level, the lower the importance assigned to the brand.

Sixth, consumer awareness of product safety levels negatively affects the degree of brand attention: the lower the ability to identify a brand, the greater the brand value, which is parallel to the findings by Banerji et al. (2016) and Zhou et al. (2017).

Seventh, consumers' ability to identify different meat types positively impacts the extent of attention, that is, brand attitude increases with the ability to identify meat types. To some extent, it is analogous with the finding form Banerji et al. (2016).

5. Conclusions and implications

Based on the logit regression of the 1,050 randomly selected observations, the results of the analysis show that consumers' attitudes towards pork brands are highly related to the following five aspects.

First, for consumers' individual characteristics, the empirical results shows that consumers' attitude towards pork brands is highly related to consumers' age. As is demonstrated, consumers' age has a negative effect on their attitudes towards pork brands. That is to say, young people are more likely to pay attention to pork brands on their purchasing. Accordingly, when the enterprises of the pork products and meat products construct new brands for their products, they could make strategies, such as coupon, discount, member rights for the young and attract them to purchase new branded pork products.

Second, as for consumers' consumption characteristics, the findings reveal that consumers' attitude towards

pork brands has significant correlation with the amount of money spent in a single purchase. Individuals with larger amount of money spent in a single purchase tend to be more likely to have a higher attitude towards pork brands. Thus, the sellers could observe which consumers purchase large amount of meat every time and promote the new branded products to them.

Third, regarding consumers' risk perception, the study discloses that consumers' attitude towards pork brands exhibits a statistically significant relationship with consumers' risk perception. High risk perception consumers are less likely to new branded products and tend to pay more attention to good word-of-mouth products and get quality information from their relatives, friends, and colleges. For these people, the sellers could introduce the lower risk for the new branded products and encourage them to have a try to consume new branded products.

Fourth, concerning consumers' professional knowledge, this study uncovers that consumers' attitude towards pork brands is significant associated with consumers' awareness of nuisance-free foods, consumers' awareness of the quality of fresh, cold, and frozen meats. Consumers with less knowledge of green food and more knowledge of nuisance-free food tend to have high attitude towards pork brands. The sellers could spend more time on identifying which consumers own high knowledge of nuisance-free food and less knowledge of green food and promote pork products to them.

Finally, for the consumers' product identification ability, the analysis results suggest that that consumers' attitude towards pork brands have significant association with consumers' awareness of product safety levels and consumers' ability to identify different meat types. It is clear that intrinsic perception of quality and safety has negative effect on consumers' attitude towards pork products; while extrinsic identification of pork meat types has positive impact. That means the extrinsic attributes are more important than intrinsic ones and hence the sellers could pay more attention to the extrinsic attributes.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Appendix

A1. Pork consumers' questionnaire.

Interview time:
Interviewer:
Interview place:
1. Where do you usually buy pork? Why?
(A) I buy all of them in this market._____
(B) I buy mainly here, and sometimes go to a market or supermarket nearby.
The market (or supermarket) name is (or are):_____
(C) I buy mainly in_____supermarket (or market), and I just come here to buy it once in a while.

(D) I buy mainly here and in _____ supermarket (or market), and I buy pork about the same number of times in these two places.

2. How often does your family buy pork?

(A) Everyday (B) Every other day (C) Once every three days (D) Once every four days (E) Once every five days (G) Less often

3. The average cost in your family to buy fresh pork is about (   ).

(A) Less than 10 RMB (B)10-20 RMB (C)20-30 RMB; (D)30-40 RMB (E) More than 40 RMB

4. The proportion of your family's monthly expenditure on fresh pork accounting for the total meat expenditure is (…).

(A) More than 90% (B) 70%-90% (C) 50%-70% (D) 30%-50% (E) 10%-30% (G) Less than 10%

5. If the stall does not label the pork, can you clearly identify the following pork products? (   )

(A) Streaky pork (B) Tenderloin pork (C)Tail pork (D)Top buttock pork (E) Fore hock

(G) Blade (H) Pork belly (I) Hindquarter pork (J)Trotters (K) Head (L) I cannot identify

6. What pork brands do you know_____, any other brand?   _____

7._____Which brand of pork have you bought the most so far this year, and why?_____

8. There are [enter number] _____ individuals who often eat at home in your family.

When you buy pork, whose needs/preferences do you focus on? Choose the best option (   ) and fill the number below.

(A) My own (B) Spouse (C) Child (Age:____) (D) Grandchild (Age: ___) (E) Host (Age:____)

(G) Hostess (Age:___) (H) Host's child (Age:____) (I) Host's grandchild (Age:____)

(J) Others: (Age: ___)

9. Choose the five most important factors you consider when buying pork

below _____ , _____, _____, _____,_____

Using a score from 1 (low) to 10 (high) for each factor indicate how important they are.

(A) Brand_____ ; (B) Nutrient _____; (C) Price_____; (D) Safety_____;

(E) Word mouth _____ ; (G) Appearance_____; (H) Taste _____; (I) Freshness_____; (J) Sales person's service attitude_____;   (K) Others:_____ _____.

10. Have you heard about Green food? (   ) [Enter Yes or No]

Have you heard about Organic food? (…) [Enter Yes or No]

Have you heard about Nuisance-free food? (   ) [Enter Yes or No]

Using a scale from 1 (no knowledge) to 10 (high knowledge), indicate how much you know about:

Green food_____, Organic food_____, and Nuisance-free food_____.

11. What do you think is the safety level of pork sold on the market? (   )

(A) Very low (B) Low (C) General (D) High (E) Very high

12. Do you think you can distinguish the quality of pork in terms of safety?

(A) It is difficult to (B) Generally not (C) Maybe, generally (D) In most cases (E) Can be fully

13. Which aspects do you usually use to determine which pork product is safer? (   )

(A) Simply cannot judge (B) Higher prices, higher safety (C) Judge by observing its appearance

(D) Introduction and promotion from the meat seller (E) Opinions of relatives and friends

(G) More popular, higher safety (H) Brand (I) Inspection and quarantine or certificate

(J) Trust the people who sell the meat, so trust the meat (K) Origin (L) Other:_____

14. Have you ever bought cold fresh pork?_____

On average, you buy cold fresh pork every_____days [enter number];

and your most recent purchase is_____ days;

the brand of cold fresh pork you bought is_____.

15. Will you start or continue to buy cold fresh pork in the future?

(A)No, I won't. Why?_____

(B) Yes, I shall. Why?_____

(C) It depends. On which situation will you buy pork?_____

16.Personal information

    Gender: _____ ; Age: _____ ; Educational attainment: _____

17. The average monthly household income is:

(A) Less than 3000 RMB (B) 3001-5000 RMB (C) 5001-7000 RMB (D)7001-9000 RMB (E) 9001-11000 RMB (G)

11001-20000 RMB (H) More than 20001 RMB

18. The occupation of the family's primary income earner is:

(A) Management personnel of enterprises and institutions (B) General staff of enterprises and institutions (C)

Teacher (D) Government civil servant (E) Private business owner (G) Individual industrial and commercial

households (H) Other

Notes: Hot fresh pork refers to fresh pork sold directly after slaughtering without cooling treatment, the temperature of pork is about 40-42 °C. Cold fresh pork refers to pork cooled quickly after slaughtering, the temperature of pork should be decreased and kept at 0-4 °C throughout circulation and distribution. Frozen pork refers to pork frozen and preserved in an environment below -23 °C after slaughtering.

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