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Enhancing broiler product consumption: the influence of consumer perceptions and information delivery—evidence from five Chinese provinces

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Introduction: Given the advantages of broiler products in quality, nutritional value, and environmental benefits, as well as their crucial role in China's food security, this study focuses on strategies to enhance their consumption. A major constraint to consumption growth is the lack of consumer awareness. This study investigates how information delivery influences consumer perceptions, aiming to promote consumption growth and achieve sustainable development in the broiler industry.

Methods: A scenario experiment approach was used, recruiting 416 consumers across five provinces. Twelve messaging strategies were developed to evaluate their impact on consumer perceptions, considering both the source and type of information provided.

Results: The experiment revealed that both the credibility of the information source and the nature of the content significantly influenced consumer perceptions. Information from credible sources and positive content notably enhanced perceptions. Analytical information had a more substantial impact than conclusive information, while negative information adversely affected perceptions.

Discussion: The study recommends optimizing information dissemination strategies and using highly trusted platforms to deliver positive analytical information about broiler products. This approach aims to enhance consumer perceptions and stimulate consumption. The findings provide an empirical foundation for industry practitioners and policymakers to better understand consumer behavior and develop effective marketing and education strategies, supporting the sustainable development of the broiler industry and optimizing China's meat consumption structure while ensuring food security.

KEYWORDS

broiler products, consumer perceptions, information delivery, scenario experiment, sustainable development, food security

1 Introduction

Meat, as a crucial source of nutrition, holds profound symbolic and social significance across various cultures. With China's flourishing economy and notable enhancements in production conditions, the nation has emerged as the world's largest meat-consuming market (Zhou, 2021). Since the early 1990s, China's meat consumption has steadily increased, nearing

100 million tons by 2021, representing 27% of the global total (OECD and FAO, 2023), thereby exerting a substantial impact on national food security, particularly feed security (Bai et al., 2014).

The global landscape of meat consumption has been experiencing significant shifts. Since 1961, the *per capita* consumption of poultry meat has surged from 12 to 40%, establishing itself as the predominant meat category (FAO, 2024). This transformation has been fueled by various factors such as price sensitivity, heightened health consciousness, evolving cultural and dietary patterns influenced by globalization, and the efficient supply chain of the poultry industry (Gallet, 2010; Leroy and Praet, 2015; Milford et al., 2019; Céline Bonnet, 2020). In China, while pork remains the primary meat choice, its consumption share has dropped from 62 to 53%, accompanied by a rise in beef, lamb, and poultry consumption. Notably, chicken represents a significant 71% of poultry meat intake, highlighting its importance in the diet (Ding and Cheng, 2021). The surge in chicken consumption can be attributed to several advantages: advancements in genetic breeding and farming techniques have led to a lower feed-to-meat ratio for white-feathered broilers, which is significantly lower than that of pigs and cows, resulting in conservation of food resources and decreased land reliance (Ozturk et al., 2012).

Furthermore, white-feathered broilers are rich in high-quality protein, contributing to improved national health (Cleveland Clinic, 2024), and their farming process is environmentally friendly with a low carbon footprint (Caro et al., 2017). In light of China's limited land resources, it is crucial to increase the consumption of white-feathered broilers and promote the substitution of chicken meat for pork. Presently, China's *per capita* chicken meat consumption is notably lower compared to major meat-consuming countries. In 2022, it was revealed that China's *per capita* chicken meat consumption stands at 14.61 kg, significantly lower than the United States at 51 kg per person and Japan at 23 kg per person, a country with similar consumption patterns to China (Cnagri Database, 2023). This disparity not only underscores the growth potential of the Chinese market but also suggests opportunities to enhance meat consumption efficiency through altering consumption patterns. By encouraging the consumption of white-feathered broilers and shifting from pork to chicken to align with global averages, China could potentially conserve 50 million mu of land resources. Achieving consumption levels on par with the U.S. could result in saving up to 150 million mu of land. Such a transition would positively impact China's food security, steer consumers towards a healthier and more environmentally friendly diet, promote sustainable resource utilization, and enhance national health.

Agricultural production in China faces challenges due to limited arable land, water resources, and ecological degradation. Scholars such as Zhang (2021), Wang (2023), and Gao and Song (2024) emphasize the importance of enhancing agricultural infrastructure through new varieties and technologies, as well as advancing mechanization and intelligence. As socioeconomic progress unfolds, dietary requirements have evolved, leading to new demands for food security. Han (2022) and Li (2022) stress the necessity of ensuring both quantity and nutritional quality in food security. Guided by the 'big food concept', China's agri food system is transitioning towards a nutrition-centric growth phase (Chen and Xu, 2023). However, current research predominantly focuses on supply-side approaches, with limited exploration of demand-side dietary adjustments. Qiu et al. (2023) conducted a qualitative analysis, but more detailed strategies are required to influence consumer behavior in altering meat consumption patterns, optimizing diets, and conserving feed grain resources. This study addresses demand-side factors by utilizing experimental economics to raise awareness of the nutritional benefits of 'high protein, low fat, low calorie, low cholesterol' diets. By advocating for broiler consumption over red meat, it aims to tackle food security and public health issues in China, providing innovative insights for policy development.

2 Literature review

Current research extensively examines the effects of meat consumption on health and the environment. Numerous studies highlight the negative health outcomes associated with consuming red meat, which includes beef, veal, pork, and lamb (Bouvard et al., 2015; Domingo and Nadal, 2016). Despite being nutrient-rich, red meat consumption has been linked to an increased risk of various cancers, such as colorectal, lung, esophageal, and gastric cancers (Wolk, 2017). The International Agency for Research on Cancer categorizes processed meat as a Group 1 carcinogen and red meat as a Group 2A probable carcinogen (Bouvard et al., 2015). Specific compounds like Neu5Gc found in red meat may contribute to this cancer risk (Bardor et al., 2005).

Furthermore, saturated fats in red meat could hinder insulin secretion, potentially facilitating the development of colorectal cancer (Guo et al., 2015). The heme component in red meat can be metabolized in the gut to form harmful substances, which may promote the formation of carcinogens (Le Leu et al., 2015). While red meat provides essential nutrients, its potential health risks, including cancer and diabetes, highlight the importance of consuming it in moderation. In addition to health concerns, meat consumption also presents environmental and food security challenges by contributing to greenhouse gas emissions (Shafiullah et al., 2021) and global warming (Semba et al., 2020). The growing demand for meat leads to increased feed requirements, putting pressure on food resources and land availability (Tilman and Clark, 2014). To address these issues, experts suggest reducing red meat consumption and exploring alternatives like poultry or reassessing meat consumption patterns (Aiking and de Boer, 2020; Céline Bonnet, 2020; Damigou et al., 2023).

In the existing literature, scholars have extensively examined the various factors that impact consumer meat consumption patterns, with a particular focus on economic influences. Key economic factors include *per capita* income, urbanization rates, and meat product prices (Aziz et al., 2021b, 2021c). Research has revealed an interesting inverted 'U' relationship between meat consumption and income, as discussed by Bodirsky et al. (2015). In less developed regions, there is a notable increase in meat consumption with rising income levels, as noted by Schmidhuber and Shetty (2005). Additionally, there has been a noticeable shift among consumers from staple foods to vegetable oils, sugar, and animal-based products, as highlighted by Popkin (1993). Concerns about animal welfare and environmental sustainability in advanced economies have prompted some individuals to reduce their meat intake or explore alternative options, as discussed by Parlasca and Qaim (2022). Urban areas are characterized by better cold chain logistics, increased access to mass media, and higher levels of meat consumption outside the home (York and Gossard, 2004). Gallet (2010) pointed out a negative correlation between meat demand

and prices, emphasizing low price elasticity. Fluctuations in the prices of grains, pork, and poultry have a significant impact on the demand for other livestock products. Moreover, demographic and socio-statistical factors also play a crucial role in shaping meat consumption habits. Studies have shown that women tend to consume less livestock meat than men.

In contrast, livestock and poultry meat consumption typically decrease with age and higher levels of education, as indicated by Pfeiler and Egloff (2018). Research also suggests that men, younger and middle-aged individuals, larger families, and those with lower levels of physical activity tend to consume more meat, as discussed by Koch et al. (2019). From a micro-level perspective, individuals' food choices are influenced by a combination of physiological, psychological, and cognitive factors. Factors such as taste, freshness, appearance, ease of preparation, healthiness, and fat content play a significant role in consumers' decisions when purchasing meat products at a reasonable price (Battagin et al., 2021; Hötzel and Vandresen, 2022). Moreover, in developing countries where women are marginalized, their food choices are also greatly influenced by their socio-economic and cultural factors (Aziz et al., 2020, 2021a, 2022).

The main drivers of individual consumption are challenging to alter directly through policy interventions. However, consumer attitudes can be influenced indirectly by adjusting preferences, habits, and perceptions. For instance, consumer values can be changed by addressing cognitive dissonance and allowing values and behaviors to coexist (Rothgerber and Rosenfeld, 2021). Scholars have employed various interventions and messaging styles to reduce meat consumption effectively. Bertolotti et al. (2020) experimentally demonstrated that message content and style significantly impacted participants' attention and future meat consumption intentions, with dietary self-efficacy moderating this effect. Carfora et al. (2017) found that a text message intervention effectively reduced processed meat consumption, exploring the mediating roles of anticipated regret and intentions. Carfora et al. (2019) utilized a chatbot for daily messages, showing that emotional interventions had positive effects. Hughes et al. (2023) studied the effects of health, climate, and pandemic warning labels on meat consumer behavior, finding that image warning labels promoted healthier meat choices. Additionally, Wistar et al. (2022) and Vasiljevic et al. (2024) highlighted the significant impact of message framing, presentation, and content on consumer behavior and attitudes. These studies lay the foundation for developing effective consumption intervention strategies.

Moreover, previous research also highlighted the adverse effects of meat consumption on the environment and human health, suggesting a shift towards artificial meat alternatives or a reduction in meat intake. However, current studies overlook the potential for rapid changes in consumer behavior towards meat consumption and the general resistance towards artificial meat products. The long-term implications of widespread artificial meat consumption also remain unclear. Conversely, poultry products, particularly chicken meat, offer various advantages such as low fat, low energy, low cholesterol, and high protein content. The broiler industry in China has made significant strides in intensification, industrialization, scale, and standardization to meet consumer needs. From the perspectives of food security, nutrition, and environmental sustainability, broiler products present a viable option to lessen red meat consumption. Despite these benefits, limited consumer awareness about the broiler industry and its products hampers consumption growth. This study aims to use information economics and experimental economics to explore the impact of different strategies for disseminating information on consumer awareness of broiler products. The objective is to improve consumer understanding and consumption of chicken products, optimize meat consumption patterns in China by replacing red meat with white meat, and enhance China's food security.

The remaining part of the paper is structured into several sections. Section 3 covers theoretical analysis and research hypotheses. Section 4 discusses the methodology. Section 5 focuses on the empirical result. Section 6 presents the discussion. Finally, Section 7 concludes with the paper's overall implications.

3 Conceptual framework and hypotheses development

3.1 Information sources and consumer perceptions of broiler products

The rise of mass media has led to the transformation of modern society into a mediatized society (Hjarvard, 2008). Through this process, media continuously infiltrate and shape interpersonal relationships as well as the relationship between individuals and society, further intensifying the level of mediatization (Livingstone, 2009). Among the plethora of multimedia technology platforms, social media stands out for its significant impact on people's daily lives by offering diverse and immediate information. Consumers can access information about desired products from various sources, such as search engines, government websites, and online forums (Jansen and Spink, 2006). Different types of information sources vary in credibility, and consumers perceive information differently based on professionalism and authority (Wu et al., 2022). Official information from government websites is generally considered the most trustworthy and reputable (Sun et al., 2019). Government and official organizations are seen as having high authority and credibility online, leading to a strong level of trust from the public (Metzger and Flanagin, 2013). The potential for severe consequences if false information is published motivates governments to prioritize honesty in their communications, further enhancing consumer trust. According to previous studies (Fogg et al., 2001), specific websites in virtual social environments tend only to showcase positive news about their products while neglecting any drawbacks. Moreover, information providers who remain anonymous are often viewed as lacking objectivity and expertise (Sun et al., 2019), resulting in lower credibility and decreased consumer trust. Consequently, the perception of broiler products may vary depending on the source of information. This study categorizes information sources into government gazettes and internet news and investigates their impact on consumer perceptions of chicken products. The hypotheses put forth in this study are as follows:

> *H1*: The authority of various information sources varies, leading to differences in consumer trust. Consumers tend to place more trust in CCTV news channels than in WeChat self-media. The delivery of information through the CCTV news channel has a more significant impact on consumers' cognitive change regarding broiler products.

3.2 Types of information conditions and consumer broiler product perceptions

Information goes through four stages: recognizing, finding sources, evaluating, and interpreting to shape consumer cognition (Savolainen, 2006). The interpretation stage is crucial as consumers analyze and manipulate various information types through cognitive processes to comprehend them. Upon acceptance and understanding, consumers merge this new information with existing knowledge to develop a comprehensive perception of the product, influencing their purchase decisions (Hawkins, 2003). The presentation of information significantly impacts its quality and how well consumers understand it (Dai and Gong, 2024). Different ways of presenting information affect readability, ease of comprehension, and accuracy, influencing the cognitive effort required by consumers (Goolkasian and Foos, 2002). When information is presented clearly and understandably, consumers are more likely to process it effectively and absorb the message. For instance, presenting conclusive information (direct conclusions or results) as opposed to analytical information (data, evidence, and analysis) can have varying effects on consumers' decision-making processes and information-processing efficiency (Kelton et al., 2010). Consumers may question conclusive information about broiler products if they lack supporting evidence, leading to ambivalent attitudes.

In contrast, analytical information that includes data, evidence, and analysis can enhance persuasion and increase consumers' confidence, ultimately improving their perception of broiler products. This study examines how different types of information expression (conclusive vs. analytical) impact information quality and influence consumers' attitudes and decision-making regarding broiler products. In addition, Consumer perceptions are influenced by both positive and negative biases in information (Tran and Paparoidamis, 2021). Due to loss aversion and sensitivity to uncertainty, consumers are more attentive to negative information. When communicating broiler product information, solely positive information can improve consumer perceptions. Still, the inclusion of negative information leads consumers to focus more on the negative aspects, diminishing the positive impact of positive information. This phenomenon allows the 'negativity effect' of negative information to take precedence. Thus, this study puts forward the hypothesis:

> *H2a*: Consumers are able to obtain more effective information from analytical information as it provides explanations for decisions and conclusions in the delivery process. Their perceptions of broiler products change more when exposed to analytical information compared to conclusive information.
>
> *H2b*: The level of consumers' cognition of white feather broilers will be enhanced when the transmitted information is positive, while it will be constrained if the information is negative. Negative information has a more significant impact on changing consumers' perceptions of broiler products.

3.3 Initial consumer attitudes and consumer broiler product perceptions

Consumer behavioral science highlights the importance of considering consumers' initial attitudes and factual beliefs about a product when assessing the impact of different information on consumer reception. Studies by Ahteensuu (2012) and Vainio et al. (2018) underscore the significant influence of these initial attitudes on the effectiveness of information communication. For instance, individuals with a favorable attitude towards a product are more receptive to new information, demonstrating a willingness to comprehend and positively process it. Recently, a study by Aziz et al. (2024) revealed that people's attitude plays an important role in adopting advanced technology. Likewise, in the context of red meat consumption, the attitude of regular consumers makes them perceive it as nutritious, essential, and ethical (Piazza et al., 2015). Food choices are closely tied to individuals' positive beliefs about specific foods (Abrahamse, 2020). When individuals believe that chicken is a healthy option, they are more likely to engage in detailed information analysis, leading to a comprehensive understanding of chicken product benefits. Conversely, misconceptions such as associating chicken with rapid growth or hormones may result in a skewed interpretation of information, leading to misunderstandings. Moreover, when consumers are presented with information that conflicts with their initial attitudes, interpretive bias may cause them to avoid contradictory information. Consumers who hold positive beliefs about broiler products may disregard negative reports, while those with negative beliefs may overlook positive reports, impeding an accurate perception of chicken products.

> H3: When consumers receive information, their initial attitude towards broiler products influences how they understand and interpret the information, resulting in varying levels of cognitive change. Consumers with positive initial attitudes tend to process the information more effectively, leading to a more significant change in their level of cognition under the same information conditions.

The overall research framework regarding the impact of information delivery on consumer perceptions of broiler products is shown in Figure 1.

4 Methodology

4.1 Variables selection

4.1.1 Consumer broiler product cognition

Consumer broiler product cognition involves consumers' subjective psychological willingness and encompasses their subjective judgments, value evaluations, and objective quality attributes of the product. This study extends previous research on broilers by utilizing a multidimensional scale adapted from existing literature and tailored to this investigation. The three-dimensional consumer broiler product perception scale includes dimensions such as sensory and nutritional value perception, chemical residue and disease perception, and market regulation perception, with a total of 23 question items. A five-level Likert scale was used in the questionnaire to assess consumers' perceptions of broiler products. Respondents rated each item based on their objective perceptions and assigned scores from 1 to 5. The dependent variable in this study is the change in consumer perception, calculated as the difference between post-experimental and pre-test consumer perception values.

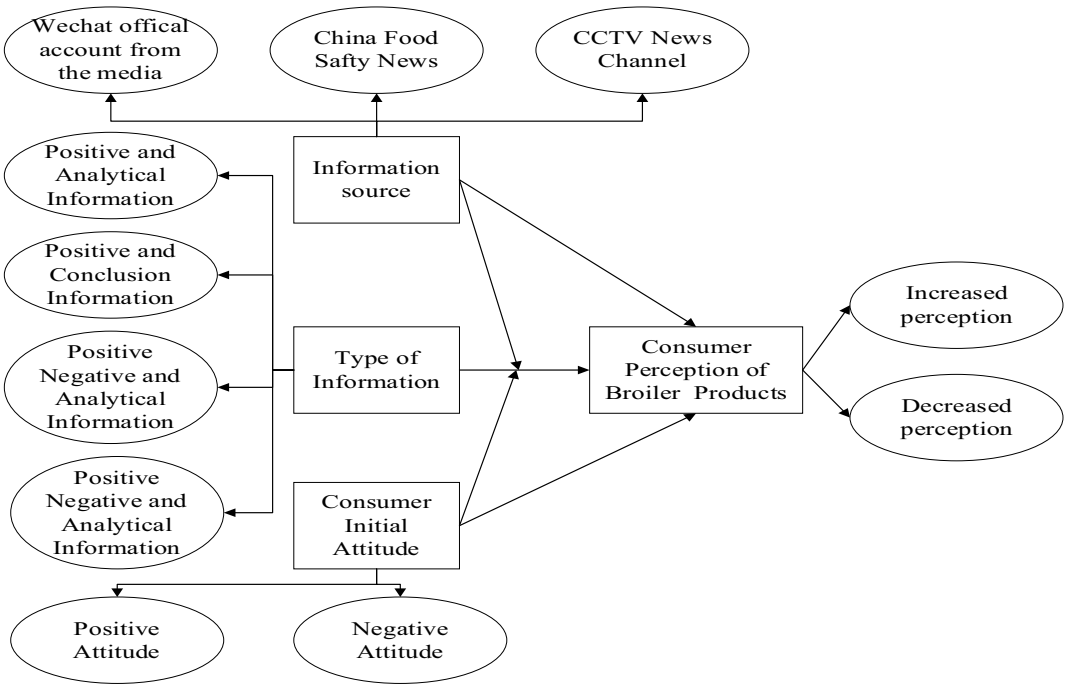

FIGURE 1
The research model of the interaction of information source subject, initial attitude, and information condition type.

4.1.2 Information sources

This study evaluates the public's perception of professionalism, authority, and trust in various information sources. WeChat Public Self-Media, China Food Safety Newspaper, and CCTV News Channel are identified as the most trusted sources of information. The research aims to analyze how consumers' trust in these critical sources influences their perceptions.

4.1.3 Types of message conditions

According to Herr et al. (1991), the study analyzed the impact of message characteristics on consumer attitudes in interpersonal information dissemination. The findings revealed that vividly described and detailed messages have a more significant influence on consumer attitudes compared to lightly or generically described messages. Furthermore, the study highlighted that the positive and negative directions of messages affect consumer perceptions in distinct ways. The information condition types are classified into four categories: entirely positive analytical information, completely positive concluding information, both positive and negative analytical information, and both positive and negative concluding information.

4.1.4 Consumer initial attitude

This study categorizes consumer attitudes into positive and negative attitudes based on their perception scores. A total of 23 question items were used to measure consumer perception, with a scoring system where a total score exceeding 69 points indicates a positive attitude towards broiler products. In contrast, a score below 69 indicates a negative attitude.

4.1.5 Control variables

Consumer demand for information can significantly impact the processing and interpretation of information when consumers are exposed to it. This paper incorporates consumer demand for information regarding nutritional value, chemical residues, and epidemics into the empirical study model. Additionally, to account for the influence of consumers' characteristics, gender, age, and education level are included as control variables in the regression model. The variables are defined in the Table 1 below.

4.2 Experimental design

This study explores the impact of various information delivery methods on consumer perceptions of broiler products, taking into account varying initial attitudes. The factors considered include the source of information (microblogging public media, government gazette, and CCTV news channel) and the type of information provided (entirely positive analytical, completely positive conclusive, both positive and negative analytical, and both positive and negative conclusive). A $3\times2\times2$ factorial experimental design was employed, combining different content scenarios for broiler products sourced from China Food Safety News and CCTV News Channel, as well as WeChat Self-Media. The study investigated 12 different combinations of messaging strategies, detailed in Appendix 1. The experimental procedure involved administering a front-side questionnaire to assess the subjects' initial attitudes. Following this, 12 groups of experimental information were randomly distributed to the subjects, who read the content based on their reading habits for approximately 10 min (the duration of which was undisclosed to the subjects). Subsequently, the experimenter provided a formal experimental questionnaire. Upon completion of the questionnaire, the experimenter ensured its accuracy and then offered the payoff, concluding the experimental process. Consumer selection was conducted using a completely randomized method to identify individuals exposed to each messaging

TABLE 1 Variable definition and assignment.

Variable		Assignment and description
Dependent variable		
Changes in consumer perception		Score, Continuous Variable
Independent variable		
Information source	WeChat at the official account from the Media	1 = WeChat at the official account from the Media 0 = Other source
	CCTV News Channel	1 = CCTV News Channel 0 = Other source
Type of information	Positive and analytical information	1 = Positive and Analytical Information 0 = Others
	Positive and conclusion information	1 = Positive and Conclusion Information 0 = Others
	Positive, Negative, and Analytical Information	1 = Positive, Negative, and Analytical Information 0 = Others
	Consumer Initial Attitude	1 = Positive Attitude; 0 = Negative Attitude
	Information Source* Type of Information	The Interactive Term of Information Source and Type of Information
	Consumer Initial Attitude * Type of Information	The Interactive Term of Consumer Initial Attitude and Type of Information
Control variable	Gender	1 = Male, 0 = Female
	Age	Continuous Variable, Age
	Education	Continuous Variable, Year
	The Demand for nutritional value information	1 = Do not care, 2 = Do not pay much attention, 3 = more concerned, 4 = very concerned
	Demand for information on chemical residues and diseases	1 = Do not care, 2 = Do not pay much attention, 3 = More concerned, 4 = Very concerned

TABLE 2 Distribution of types of valid questionnaires recovered.

	Information source		
Type of Information	WeChat at the official account from the Media (α)	CCTV News Channel (β)	China Food Safety News (γ)
Positive and Analytical Information(I)	34	36	34
Positive and Conclusion Information(II)	35	36	34
Positive, Negative and Analytical Information(III)	34	35	33
Positive Negative and Conclusion Information(IV)	34	36	35

Unit: copies.
Data Source: Research Data Collation.

strategy. To maintain sample randomness, strict regulations were imposed during the selection of consumers, such as ensuring they were not related to each other and representing diverse demographics in terms of age, education levels, and gender within each information group.

4.3 Data sources

The research initially conducted a pilot survey. Subsequently, detailed interviews with participants were conducted to optimize and enhance the number of measurements, questioning techniques, and language used in the scale. The KMO value in the questionnaire was calculated to be 0.745, with a significance level of 0.000, indicating strong validity. After refining the questionnaire, data was collected on-site in various locations across five provinces and cities, including Jiangsu, Zhejiang, Shandong, Heilongjiang, and Jiangxi, with a total of 416 questionnaires collected for analysis. Table 2 shows the even distribution of the 12 groups of information strategies in the randomized experiment to ensure representative samples. Prior to data analysis, a reliability and validity test was conducted. For reliability assessment, Cronbach's alpha coefficient was used to

measure internal consistency, yielding a value of 0.765, indicating high reliability. Regarding validity, established scales were adapted and modified to fit the research context, demonstrating a certain level of validity.

4.4 Model selection

The experimental procedure involved administering a front-side questionnaire to the subjects to assess their initial understanding. Based on previous research hypotheses and empirical experience, a model was established to test the influence of consumer messaging on consumer cognition levels.

$$Perception_1 = \alpha 1 + \beta 1 Source + \gamma 1 Type + \mu 1 Attitude + \lambda 1 X + \varepsilon 1 \quad (1)$$

In Eq. (1), Perception1 represents the change in the consumer's cognitive level. Source refers to the subject of the information source, Type indicates the type of information condition, Attitude reflects the consumer's initial attitude, and the control variables X include the consumer's characteristics, demand for information on nutritional value, and demand for information on chemical residues and epidemics. The constant term is denoted by α1, while β1, γ1, μ1, and λ1 represent the parameters to be estimated for the main explanatory variables and control variables. The random error term is denoted by ε1.

In order to investigate the moderating role of information source and consumer attitude on the effect of information condition type on consumer cognition, this study includes the interaction terms of information source and initial attitude in the model of consumer cognition determinants.

$$\text{Perception}_2 = \alpha 2 + \beta 2\ \text{Source} + \gamma 2\ \text{Type} + \mu 2\ \text{Attitude} + \varphi 2\ \text{Source} \times \text{Type} + \phi 2\ \text{Type} \times \text{Attitude} \lambda 2 X + \varepsilon_2 \quad (2)$$

In Eq. (2), Perception2 represents the change in the consumer's cognitive level. Source refers to the subject of the information source, Type indicates the type of information condition, and Attitude reflects the consumer's initial attitude. The term Source×Type signifies the interaction between the subject of the information source and the type of information condition. At the same time, Type×Attitude represents the interaction between the type of information condition and the consumer's initial attitude. The control variables X include consumers' personal characteristics, their demand for information on nutritional value, and their demand for information on chemical residues and epidemics. The constant term α2, along with the parameters to be estimated β2, γ2, μ2, and λ2, are associated with the main explanatory variables and control variables. The error term ε1 is a random error. Given that the consumer's cognitive change is a continuous variable represented by a score, Ordinary Least Squares (OLS) are selected for estimation in the empirical analysis.

TABLE 3 Survey sample population distribution.

Variable name	Variable	Number of sample (Percentage %)
Gender	Male	184 (44.23)
	Female	232 (55.77)
Age	20–30	130 (31.49)
	30–40	117 (28.10)
	40–50	89 (21.36)
	Above 50	80 (19.05)
Education	Junior high school and below	114 (27.4)
	High School and Secondary School	87 (20.91)
	College and above	215 (51.68)
Income	3,000 RMB and below	15 (3.61)
	3,000–8,000 RMB	90 (21.69)
	8,000–13,000 RMB	116 (27.95)
	13,000–18,000 RMB	77 (18.55)
	18,000–23,000 RMB	58 (13.73)
	Above 23,000 RMB	60 (14.46)

Data Source: Research Data Collation.

5 Results and discussions

5.1 Descriptive statistics

5.1.1 Survey sample characteristics

By analyzing questionnaires and variables from previous research conducted both domestically and internationally, this study found that there was a balanced gender distribution among consumers, with males representing 44.23% and females representing 55.77% of the total sample. The sample selection process favored consumers over the age of 20 due to their more substantial purchasing power, resulting in a fairly even distribution across age groups. The age group of 20–30 accounted for the highest percentage at 31.49%, followed by the 30–40 age group at 28.10% and those over 40 at 19.05%. The majority of respondents had a college education or higher, representing 51.68% of the total sample. When considering household income, the sample was diversified across income brackets, with the 8,000-13,000-yuan bracket being the largest at 27.95% (Table 3).

5.1.2 Consumers' initial perception of broiler products

By analyzing data from 23 entries on consumers' perception of broiler products, this study identified three key dimensions: sensory and value perception, chemical residues and epidemics perception, and market regulation perception. The results, highlighted in Table 4 due to space constraints, reveal that consumers have a moderate level of sensory and nutritional value cognition regarding broiler products. While some beliefs, such as 'eating chicken every day is good for nutritional health' and 'chicken is a high-quality protein source' are prevalent, other perceptions fluctuate around a mean score of 3. This indicates that overall, consumers' perception of the sensory and

TABLE 4 Perception results of selected consumers of broiler products.

Perception of Consumers about Broiler product		Score					Mean	Standard Deviation
		1	2	3	4	5		
Consumer perception of the sensory and nutritional value of broiler products								
Eating the right amount of chicken every day is good for my nutritional health	Number Percentage(%)	15 3.61	26 6.25	75 18.03	230 55.29	70 16.83	3.75	0.93
I think chicken is a good source of protein	Number Percentage(%)	8 1.92	23 5.53	75 18.03	231 55.53	79 18.99	3.84	0.86
I think chicken is lower in fat than pork	Number Percentage(%)	9 2.16	19 4.57	80 19.23	215 51.68	93 22.36	3.88	0.88
…							…	
Consumers' perception of chemical residues and epidemic diseases in broiler products								
I am worried that there are a lot of chemical residues in chicken, and eating more chicken will affect my health	Number Percentage(%)	51 12.26	126 30.29	93 22.36	108 25.96	38 9.13	2.89	1.18
I am very concerned that the rapid growth of broiler chickens currently on the market is due to the stimulating effect of hormones	Number Percentage(%)	11 2.64	37 8.89	58 13.94	227 54.57	83 19.95	3.80	0.95
I am concerned about purchasing chicken products with poultry blight	Number Percentage(%)	9 2.16	29 6.97	46 11.06	209 50.24	123 29.57	3.98	0.94
…							…	
Consumers' perception of market supervision of broiler products								
I think the government's supervision of the sanitary environment and epidemic disease of broiler farms is effective	Number Percentage(%)	13 3.12	55 12.74	94 22.60	212 50.96	44 10.58	3.53	0.95
…							…	

Data Source: Research Data Collation.

nutritional value of broiler products is not particularly strong. Furthermore, consumers' uncertainty regarding chemical residues, influenced by information asymmetry and loss aversion, may lead to incorrect judgments on this topic. The survey results on consumer perceptions of chemical residues and epidemics in broiler products revealed that a majority of respondents expressed concerns about the presence of chemical residues in chicken, such as oxytetracycline and tetracycline, and its potential impact on health. The average score for this concern was 2.89, with over 73% of consumers expressing intense worries. On the topic of 'hormone chicken,' consumer knowledge showed significant improvement, with an average score of 3.8. A majority (75.52%) of consumers disagreed with the concept of 'hormone chicken,' attributing this shift to industry and government efforts in addressing the issue over the past 2 years. This increased awareness has led to a moderate to high level of consumer consciousness regarding poultry diseases.

TABLE 5 Consumer cognitive changes under different information transmission strategies.

Type of Information	αI	αII	αIII	αIV
Mean	5.53	3.49	1.74	−0.97
Standard Deviation	4.11	2.82	3.80	6.07
Type of Information	βI	βII	βIII	βIV
Mean	11.03	6.28	4.08	2.94
Standard Deviation	20.13	4.56	6.43	6.70
Type of Information	γI	γII	γIII	γIV
Mean	5.14	4.41	3.18	−0.54
Standard Deviation	3.30	2.85	3.26	6.66

Data Source: Survey Data Statistics.

Regarding concerns about purchasing chicken products affected by poultry diseases, 29.57% of consumers reported no worries, while 50.24% expressed minimal concern. Consumers displayed a slightly higher awareness of the handling of diseased and dead chickens and the sampling of broiler products compared to chemical residues. Furthermore, consumers' perceptions of market regulations influenced their purchasing decisions. In examining consumers' perceptions of market regulation of broiler products, it was found that overall, consumers have a positive view of market regulation. While there was a slight concern regarding the timeliness of knowing regulatory actions (mean score of 2.87), all other aspects scored above 3, indicating a strong confidence in market regulation.

5.1.3 Comparison of changes in consumers' cognition of broiler products under different information transmission strategies

Different messaging strategies have varying impacts on consumer understanding of broiler products. Analyzing Table 5, it is evident that positive analytical information has the most substantial influence on consumer cognition. The addition of negative information weakens this effect, with conclusion-type information having a lesser impact. Interestingly, conclusion-based information shows a more pronounced decrease in consumer cognitive level when negative information is added. In contrast, CCTV news has a significantly different effect on consumer cognition compared to other sources. Consumers show the greatest response to CCTV news, resulting in the most significant change in product cognition. The impact of WeChat public number self-media and China Food Safety Newspaper on cognition, however, is less distinct.

5.2 Empirical analysis of information transmission on consumers' cognition of broiler products

Stata 15.0 was utilized to estimate the econometric model presented in Table 6. Model II differs from Model I by incorporating interaction terms of information source and initial attitude on the type of information condition after standardizing the variables. Both models exhibit an overall fit R2 exceeding 70% and a significant test *p*-value of 0.0001. This suggests that the hypothesis of coefficients being zero is rejected, indicating a statistically significant effect of at least one set of variables on the explanatory variables. Furthermore, the p-value for the parallel lines hypothesis test in Model II is 0.068, signifying that the independent variables adhere to the parallel lines hypothesis and their regression coefficients can be deemed consistent, thereby supporting the use of an ordered Logit regression.

Different sources of information have a significant impact on consumer perception of broiler products. According to Model I, CCTV news positively influences consumer perceptions by 3 points at a 5% significance level. This finding builds upon previous studies (Ismagilova et al., 2020; Chang et al., 2021) and aligns with social identity theory (Tajfel, 1986). CCTV, being a national media outlet, is seen as authoritative and credible, thus boosting the acceptance and influence of the information it provides. On the other hand, WeChat information does not notably improve consumer perceptions, possibly due to consumer skepticism stemming from the multitude of sources on social media and the absence of third-party verification. Moreover, in a saturated information environment, it is challenging to capture attention with information from a single channel. This underscores the importance of considering information credibility and dissemination strategies when using social media to communicate about broiler products. It is important to highlight that WeChat has a negative impact on consumer perceptions, indicating a potential shift towards negative cognitive responses to untrustworthy sources. This observation is in line with previous research (Fogg et al., 2001) suggesting that some websites in virtual social environments may focus solely on positive aspects while neglecting drawbacks. Additionally, studies (Sun et al., 2019) have pointed out that the anonymity of information providers can diminish trustworthiness. Consequently, consumers exhibit less trust and more skepticism towards information shared on WeChat. In summary, the source of information plays a crucial role in shaping consumer perceptions of broiler products. Hypothesis 1 of this study is verified that the authority and credibility of information sources significantly affect consumers' cognitive level.

Further, the study findings reveal that the presentation of information significantly impacts consumers' perception of broiler products. Specifically, Model I results demonstrate that fully positive analytical information has a coefficient of influence of 7.05 at a 5% level of significance, while concluding information has a coefficient of influence of 4.76 at a 10% level of significance. This supports hypothesis H2a, indicating that analytical information is more effective than conclusion-based information in altering consumer perceptions. This aligns with Tajfel's (1986) Elaboration Likelihood Model (ELM) theory, emphasizing deep information processing for cognitive change. Moreover, our findings are in line with van der Meer and Jin's (2020) study, suggesting that consumers tend to process information through the central pathway when facing content that requires deep processing. Additionally, our study validates Hypothesis H2b, showing that exclusively positive information is more impactful in improving consumer perceptions, while the inclusion of negative information may hinder this improvement. This preference for positive information could be linked to human inclination and emotional responses, as described by Jacks and Cameron (2003), aligning with personal expectations and evoking positive emotions. On the other hand, negative information might trigger a defensive reaction, limiting information processing, a phenomenon known as the 'rebuttal effect' in psychology. The impact of the message's positivity and the depth of analysis are significant factors influencing consumer perception. It is important to note that the introduction of negative information may potentially undermine this impact, highlighting the need for a balanced

TABLE 6 Empirical analysis of the impact of information delivery strategies on consumer perception of broiler products.

Variable	Model I		Model II	
	Coefficient	Standard error	Coefficient	Standard error
WeChat at the official account from the Media	−0.61	0.90	−0.11	2.18
CCTV News Channel	3.06**	0.88	3.18**	1.32
Positive and Analytical Information	7.05***	1.04	5.89**	2.83
Positive and Conclusion Information	4.76***	1.02	3.64**	1.54
Positive, Negative, and Analytical Information	2.61**	1.03	2.94**	1.39
Consumer Initial Attitude	1.43*	0.75	5.50***	1.81
Gender	−0.95	0.69	−0.99	0.68
Age	0.02	0.04	0.02	0.04
Education	−0.46	0.40	−0.47	0.40
The Demand for nutritional value information	0.98**	0.50	1.02**	0.49
The Demand for information on chemical residues and diseases	0.47	0.48	0.56	0.48
Information Source* Type of Information	–	–	0.10	0.40
Consumer Initial Attitude * Type of Information	-	-	−2.01**	0.65
Constant Term	1.09	3.05	−0.05	3.70
R^2	0.1680		0.1878	

*, **, *** indicate that the variable is significant at the 10, 5, and 1% levels, respectively.

consideration of both positive and negative biases in message delivery. Dai and Gong (2024) emphasize the importance of clarity and accuracy in message presentation for consumers to fully grasp the content, aligning with our own research indicating that easily comprehensible messages can enhance consumer perceptions.

Furthermore, consumers' initial attitude towards broiler products significantly influences their cognitive change process. Model I analysis revealed that positive initial attitudes had a noteworthy impact on cognitive change, with a 10% significance level. Specifically, consumers with a positive attitude towards broiler products before receiving information exhibited cognitive change scores that were 1.43 points higher compared to those with a negative attitude post-information processing. This finding aligns with Hypothesis H3 and is consistent with previous studies by Vainio et al. (2018) and Ahteensuu (2012), suggesting individuals strive to maintain consistency among their beliefs, attitudes, and behaviors. The positive influence of initial attitudes underscores the importance of incorporating existing consumer attitudes into information communication strategies. When consumers hold favorable attitudes towards a product, they are more inclined to engage with new information in a positive manner (Piazza et al., 2015). In the case of broiler products, consumers with positive beliefs are more likely to embrace positive information while potentially disregarding or questioning negative information, as evidenced by studies by Abrahamse (2020) and Berndsen and van der Pligt (2004). However, if consumers harbor misconceptions, such as viewing chicken as a fast-growing or hormone-laden product, this may reinforce their biases and misconceptions when processing positive messages about chicken. Therefore, this study suggests that communication strategies should be tailored to align with consumers' initial attitudes, providing adequate evidence and explanations to mitigate cognitive biases and enhance message acceptance.

Additionally, the results found that the initial attitude and type of information condition significantly influenced consumer cognitive change. Specifically, complete positive analytical information was most effective in promoting cognitive enhancement when consumers had a positive attitude. Model II revealed that the interaction between the source of information and the type of information condition was not significant. Still, the interaction between initial attitude and type of information condition had a negative impact on consumer cognitive change. This suggests that consumers tend to engage in more thorough information processing when they start with a positive attitude. However, when presented with conclusion-based or negative content, consumers may focus more on negative aspects, leading to limited cognitive enhancement. Notably, fully positive analytical information was most beneficial for cognitive enhancement under positive initial attitudes, but changes in the type of information condition weakened this effect. While the impact of CCTV news as a source of information remained relatively consistent, variations in the type of information condition significantly influenced consumer perceptions. Complete positive analytical information resulted in a cognitive change improvement of 5.89 points at a 5% significance level. In comparison, complete positive conclusion information and analytical information with positive and negative

content improved cognitive change by 3.64 and 2.94 points, respectively. Furthermore, the inclusion of the interaction term underscored the influence of consumers' initial attitudes on cognitive change, showing that positive attitudes led to a cognitive change of 5.50 points.

6 Conclusion and policy implications

The study's findings have significant implications for how messaging strategies can improve consumer perceptions of broiler products. Specifically, it highlights the importance of considering the information source, initial consumer attitudes, and the type of information when designing messages. To enhance effectiveness, marketing strategies should focus on delivering comprehensive, positive, and analytical messages, especially to consumers with existing positive attitudes. Careful handling of messages that could evoke negative associations is also crucial to avoid negating positive effects. The study offers valuable guidance for marketing and public relations in the broiler industry, emphasizing the need to consider consumer psychology and attitudes in message development. Understanding how consumers process information can help the sector tailor messaging strategies to increase consumer awareness, promote positive attitudes, and drive desired behaviors.

To effectively guide consumer perception of poultry products and encourage rational consumption, it is recommended to enhance the credibility of information sources by encouraging government and industry associations to publish transparent information about food safety and product quality regularly. This will help boost consumer trust. Additionally, focuses on disseminating positive and analytical information to assist consumers in making informed decisions. Cultivating a positive attitude among consumers through education and promotional activities can help counteract the impact of negative information. Developing detailed and customized information dissemination strategies based on consumers' initial attitudes and preferences is also crucial. Strengthening consumer education to improve their ability to identify and process information effectively is important. Lastly, regulating the spread of negative information can prevent the dissemination of false information and protect consumers from being misled. Implementing these strategies can better protect consumer rights, maintain market order, and promote a healthy consumption environment.

This study has identified several limitations that should be considered in future research. Firstly, while the focus was on the impact of information sources and presentation on consumer perceptions of broiler products in relation to health, food safety, and industry development, it is important to note that other factors, such as environmental sustainability (Wistar et al., 2022), animal welfare, and product attributes (Hötzel and Vandresen, 2022), that could also impact meat consumption motivation. Future studies should explore these additional factors for a more comprehensive understanding. Secondly, the study only delved into the influence of messaging on consumer perceptions without fully considering various consumption scenarios, types of broiler products, and regional consumption patterns. Given the potential differences in information processing across different contexts and habits, future research should thoroughly analyze these aspects. Lastly, another potential direction for future research is to delve deeper into the mechanisms of information interventions. This could involve exploring how different types of information, such as text, images, and videos, influence consumer perceptions. Additionally, researchers could investigate how combining other interventions, like robotics or multimedia presentations, could enhance the effectiveness of information delivery. It is important also to consider the impact of the length of the post-test interval on the accuracy of experimental data to minimize bias and ensure the experiment's robustness.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material; further inquiries can be directed to the corresponding author.

Ethics statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

HL: Conceptualization, Formal analysis, Investigation, Writing – original draft, Revision, Writing – review & editing. CZ: Conceptualization, Formal analysis, Investigation, Data curation, Writing – review & editing. HY: Formal analysis, Investigation, Revision, Writing – review & editing. JH: Conceptualization, Funding acquisition, Investigation, Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2024.1420489/full#supplementary-material

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