Consumer traceable food attribute preference research--based on the survey data of 1116 consumers in chengdu

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Abstract. Previous studies have shown that traceability system is an important technical means to solve food safety problems. As a way of information disclosure, traceability system can effectively improve the problem of information asymmetry in the food supply chain, so as to overcome market failure and improve food safety to a certain extent. However, the mechanism of information transmission of traceability system is controversial. One view is that consumers obtain more food safety information through food traceability to judge whether food is safe or not. Another view is that the traceability system sends quality signals to consumers to improve their confidence and effectiveness in purchasing food. According to the current research results, based on the origin and quality attribute two variable scale design, using the survey data of chengdu, 1116 consumers SPSS factor analysis is adopted to establish the index of correlation matrix, combined the theory of information entropy, determine the index weight of two kinds of attribute information, to verify that the consumer information transfer mechanism of food traceability system preferences. The results show that 72.22% consumers prefer the food traceability system to directly transmit quality assurance signals to them, which verifies that the traceability system is more effective in solving information asymmetry through signal path.

1. The introduction

In recent years, with the increase of safety risks in the food industry, consumers are increasingly concerned about food safety issues. According to relevant research, food safety problems are mainly caused by asymmetric market information. Food traceability system, as a way of information disclosure, can effectively improve the information asymmetry in the food supply chain and achieve the traceability of food information, so as to solve the problem of food quality and safety market failure and meet consumers' demand for food quality level.

Food traceability, also known as "labelling preservation", is the ability to track food production inputs[1]. Based on the existing research results, consumers have a certain willingness to pay for the traceability of food, so as to realize consumers' expectations of food consumption, that is, to realize the effectiveness of food traceability. Rafia Halawany, et al. (2007) believes that when traceability is regarded as the information provider of origin, producer and ingredients, consumers have more confidence in the food providing such information[2]. In other words, the realization of food traceability utility is closely related to consumers' access to food-related safety information.

At present, the effect of food traceability system in China is not obvious. Surveys have shown that consumers are far less willing to pay for traceable food than for certified food, and that very few
people use food traceability for food traceability. One reason for this is that the food traceability system does not provide additional utility to consumers. The role of food traceability is only as a way for consumers to obtain food quality and safety information and reduce the cost of information search before purchase. It does not provide consumers with quality indicators and increase their purchasing confidence. On the other hand, consumers' low trust in the information provided by the food traceability system cannot enhance their confidence in purchasing. Therefore, it is necessary to clarify consumers' preference for information transmission mechanism of food traceability system.

On the basis of the analysis of existing research results, this paper takes the survey data of 1116 consumers in Chengdu city as an example to conduct relevant analysis and verify consumers' preference for the information transmission mechanism of food traceability system, which has important practical significance for improving the usefulness of food traceability system.

2. Literature review

The mainstream view holds that the traceability system is a voluntary information recording and transmission system established by enterprises to improve supply chain efficiency and establish product reputation under the pressure of the government and consumer incentives, which is mainly used to meet consumers' demand for food traceability. It is worth noting that when the information of a specific attribute of a product is systematically recorded from creation to marketing, the traceability of the product is established and can be used as a unique form of food information provided by the enterprise. Therefore, the idea of incorporating information into food attributes is considered reasonable in the research field of information traceability systems.

Based on this view, a great deal of attention has been paid to consumers' awareness level of food traceability, willingness to pay and purchase behavior. Hobbs (2003) and Umberger et al. (2008) studied consumers' preference and willingness to pay for traceable beef with different quality and safety information in different countries. Research has shown that consumers are more willing to pay for food with traceability, quality and safety guarantees, and animal welfare. However, Giraud and Halawany (2006), Lichtenberg (2008) and Hobbs (2002) agree that in real life, consumers' willingness to pay for traceable food is much lower than that for certified food. The reason is that in the certification system, consumers can directly obtain high-quality food after strict screening procedures, reducing the cost of information search before buying food. However, the existing food traceability system only reveals and delivers the quality and safety information of food to consumers, but fails to deliver the real quality signal of food to consumers, causing consumers to gradually lose or question the role of the existing food traceability system.

Based on the existing research findings, there are two main viewpoints in the research on consumers' purchasing behaviors of traceable food. One view is that consumers by buying the traceability of food for food safety information: Zhou yingheng et al. (2008) analyzed the purchasing behavior of consumers of Shanghai carrefour supermarkets on beef with traceable labels, and believed that consumers could obtain relevant quality information of beef through purchasing, so as to make them feel safer and more assured psychologically, that is, they are willing to pay extra for food safety information. Another argument is that the traceability system itself sends a quality safety signal to consumers. Deimel et al. (2010) investigated and analyzed consumers' awareness of pork traceability and found that consumers believed that traceability represented a higher level of quality and safety. Jill. E Hobbs believed that the traceability system itself could not bring much value to consumers. However, through experiments, it was found that some consumers were still willing to pay for the traceability of food, which reflected that the quality assurance signals transmitted by the traceability system itself could influence consumers' purchasing behaviour to some extent. Halawany (2007) investigated and analyzed the attitude and cognition of French and German consumers towards food traceability, and found that consumers took traceability as a safety signal to reveal food quality.

At present, empirical research on consumers' preference for food traceability is still lacking. In this paper, the main research purpose and the function is: based on the current academic research on the
behavior of food traceability to the conclusion that we do the empirical analysis on the consumer survey data of Chengdu, investigate and verify the consumer information transfer mechanism of food traceability system preferences, this to improve the availability of food traceability system and enterprise to carry out reasonable accurate marketing activities have a certain reference value.

3. The theoretical analysis

Food traceability and food supply chain activities are new factors affecting the competitiveness of agribusiness[15]. From the perspective of existing studies, due to the lack of understanding of the role of food "traceability" in the decision-making process of consumers and other reasons, there is a lack of research on consumer demand and food traceability, and there is no unified statement of the purpose of consumers to buy traceable food. However, the current research conclusions can still provide theoretical reference for this paper, which can be reflected in two aspects. Secondly, it is an important measure to improve the implementation effect of food traceability system to clarify consumers' preference for the information transmission mechanism of food traceability system.

Based on the existing research results, the author starts from the function and mechanism of food traceability system, sets two variables of origin information and quality information, and verifies consumers' preference for information transmission mechanism of food traceability system by combining factor analysis and entropy weight method. It has been proved that the selected factors of origin and quality, which are closely related to the principal components, can better reflect the overall preference level of consumers for food traceability.

4. Empirical analysis

4.1 Data sources and instructions

4.1.1 Variable design and assignment

In this paper, the design of two variables, origin attribute and quality attribute, is very important. Design with the aid of origin attribute, whether consumers want to know the source to determine pork safety related issues, including "whether to check the manufacturer on purchased food wrappers and provenance information (X21), buy pork, if want to know where pork from first (X22), don't know where pork from, will feel ungrounded (X23), whether to want to know the source of the pork, to decide whether the pork from the regular farms, slaughterhouses (X24), whether to want to know the source of the pork, so that the quality and safety problems, can easily go to liability (X25)". In order to guarantee the validity and reliability of the questionnaire, according to reference existing literature research and field research, about whether consumer behavior for direct access to information to determine pork security design problems, including "how often get all kinds of useful knowledge and information, through the media (X26) and applied to the life, want to get enough food safety knowledge and information, improve the ability to identify and distinguish (X27), to determine whether really need access to relevant information food quality (X28), buy food, Will you first check the ingredients, production date and shelf life of the food purchased (X29), and whether you want to know the breeding environment and breeding process of live pigs to judge the quality of pork (X30). All the indicators were measured with 5-point likert scale, and the values were assigned in the opposite direction according to 1-5 points.

According to the selected variables and the problems that may be involved, 10 questions related to the research in this paper are finally determined. The specific expression of all indicators was determined by the members of the research group after discussion in accordance with the actual context, and a preliminary draft of the questionnaire was designed. After the trial survey, the questionnaire was modified and improved to form the final questionnaire.
Table 1. Specification of index assignment

| Attribute                           | Indicators                                                                 | Indicator assignment specification |
|-------------------------------------|-----------------------------------------------------------------------------|------------------------------------|
| 1. Origin information               | 1. Check the manufacturer and country of origin information on the food wrappers purchased (X_{21}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 2. When buying pork, do you first want to know where the pork comes from (X_{22}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 3. If you don't know where the pork comes from, will you feel uneasy (X_{23}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 4. Do you want to know the source of the pork to judge whether the pork comes from the regular farms and slaughterhouses (X_{24}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 5. Do you want to know the source of the pork so that it can be easily held accountable in case of quality and safety problems (X_{25}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
| 2. The quality of information       | 1. How often do you get all kinds of useful knowledge and information through the media and apply it to your life (X_{26}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 2. Want to obtain sufficient knowledge and information on food safety to improve identification and resolution (X_{27}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 3. Is there a strong need for relevant information to determine the intrinsic quality of food (X_{28}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 4. When purchasing food, will you firstly check the ingredients, production date, shelf life and other information of the purchased food (X_{29}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |
|                                     | 5. Do you want to know the breeding environment and breeding process of live pigs to judge the quality of pork (X_{30}) | I couldn't agree more = 5; Agree = 4; General = 3; Disagree = 2; Strongly disagree = 1 |

4.1.2. Data collection

Dujiangyan City is listed as the first batch of national quality and safety of agricultural products traceability management platform commissioning county, one of the representative, in order to ensure the sample random sampling method to determine the professional home road, yongfeng streets, communities, build way and zhongshan road xiang wind bridge as the sampling area, choose a farmers’ market for each community fixed, deals in each fixed site random questionnaire survey to 150-240 consumers. Based on the fact that the flow time of consumers in the farmers' market is relatively concentrated, the survey was conducted at AM08:00-12:00 and PM04:00-06:00. In order to ensure the recovery rate of effective questionnaires, questionnaires are randomly distributed to consumers and filled in on the spot as the survey method. If consumers do not understand anything about the questionnaires, they can immediately inquire about it and the investigators will answer it on the spot. From September 10 to 20, 2018, trained surveyors conducted surveys at different survey sites. A total of 1,200 questionnaires were distributed and 1,150 were recovered. 37 questionnaires with missing or incomplete key information were removed.
4.1.3 Sample characteristics

Table 2. The characteristics of respondents

| Gender      | Whether there are children, the elderly, pregnant women in the family |
|-------------|----------------------------------------------------------------------|
| Male        | Yes 890 No 226                                                       |
| Female      | Yes 725 No 254                                                      |

Table 3. Reliability test results table.

| Reliability statistics | Cronbach' coefficient | A number of |
|------------------------|-----------------------|-------------|
| 1. Origin information  | 0.782                 | 5           |
| 2. The quality of information | 0.744            | 5           |

Data source: sort out data according to statistical analysis

4.2 Data inspection

In order to explain the rationality of constructing indexes describing consumers’ preference for producing and quality attributes, reliability and confirmatory factor analysis were conducted on the selection and classification of measurement indicators according to the survey data.

4.2.1 Reliability analysis

Reliability refers to the degree of reliability of sample data. Reliability analysis is also known as reliability analysis, which refers to the degree of internal consistency of the measured results after multiple measurements of the research object under the set conditions. According to studies at home and abroad, it is generally believed that the Cronbach’ coefficient is greater than 0.7, and the data is considered credible if it is greater than 0.80, and the data is considered very credible if it is 0.90. If the Cronbach coefficient is less than 0.70, the reliability of the data is poor. Therefore, before the empirical analysis, SPSS21.0 software was used in this paper to conduct the reliability analysis on the data obtained from the selected measurement indexes. The obtained reliability analysis results are shown in table 3. The Cronbach’ coefficient of the measurement indexes describing the origin information and quality information are all above 0.70, and the reliability analysis results are relatively ideal.
4.2.2 KMO and Bartlett tests
KMO (Kaiser-Meyer-Olkin) test statistic is an indicator used to compare simple correlation coefficient and partial correlation coefficient between variables. The KMO statistic is between 0 and 1. When the sum of squares of simple correlation coefficients between all variables is far greater than the sum of squares of partial correlation coefficients, the KMO value is close to 1. The closer the KMO value is to 1, the stronger the correlation between variables is, and the more suitable the original variables are for factor analysis. When the sum of squares of the simple correlation coefficients between all variables is close to 0, the KMO value is close to 0. The closer the KMO value is to 0, the weaker the correlation between variables and the less suitable the original variables are for factor analysis. In table 4, KMO value is 0.889, which is suitable for factor analysis.

| KMO and Bartlett's test |   |
|-------------------------|--|
| 1. Kaiser-Meyer-Olkin measure of sample adequacy. | 0.889 |
| The approximate chi-square | 3317.305 |
| 2. Bartlett's test for sphericity | 45 |
| df | 45 |
| Sig. | 0.00 |

Data source: analysed and arranged data according to SPSS

4.3 Research methods

4.3.1 Factor analysis
Factor analysis is a research method that comprehensively evaluates a certain thing by analyzing the correlation between many variables and applying common factors. The basic purpose of this method is to use a few factors to describe the relationship between various indicators or factors, so as to reflect a large number of multi-variable sample characteristics in the original statistical data with fewer factors. Through the reliability analysis and KMO and Bartlett's test shows that the indicators of evaluation of consumer preferences exist significant correlation, therefore, this research adopts the factor analysis method to evaluate consumer preferences of all kinds of food traceability properties, on the factor analysis of variance and orthogonal rotation process, using the principal component analysis method to analyze variables in the key factor of the load.

4.3.2 Entropy weight method
Entropy weight method is an objective method to calculate weights according to the dispersion degree of evaluation indexes. Other weight methods, such as analytic hierarchy process, expert scoring method, subjective weight method, etc., are highly subjective, which will reduce the effectiveness of calculation results. In comparison, entropy weight method is more scientific. There are several methods to determine the weight of indicators, such as Delphi method, AHP method, entropy weight method and fuzzy clustering analysis method. He hongze et al. have proposed that the above methods should be selected when the degree of data perfection is different. Through this survey, 1116 valid questionnaires were recovered, with relatively complete data. Therefore, entropy weight method is appropriate. Therefore, this paper uses entropy weight method to calculate the weight coefficient of each index. Firstly, the data is standardized, and the entropy weight of each index is calculated by information entropy, and then the weight of each index is modified by entropy weight, so as to ensure the objectivity of the obtained index weight.

The main steps are as follows:
(1) Data standardization
Let the pending evaluation items be \( Y = (Y_1, Y_2, Y_3, Y_4, Y_5, \ldots, Y_m) \) and the comprehensive evaluation system be \( Z = (Z_1, Z_2, Z_3, Z_4, Z_5, \ldots, Z_n) \), then the evaluation index system of \( n \) indicators for \( m \) evaluated objects can be expressed by the index matrix \( X \):

\[
X = \begin{pmatrix}
X_{11} & X_{12} & \cdots & X_{1n} \\
X_{21} & X_{22} & \cdots & X_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
X_{m1} & X_{m2} & \cdots & X_{mn}
\end{pmatrix}
\]

(3.1)

Because the dimensionality of each index value in the index system is not the same, the meaning represented is different, which cannot be used for direct comparison. Therefore, before comprehensive valuation, the index values are standardized, and the standardized processing formula is as follows:

\[
r_{ij} = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})}
\]

(3.2)

According to the above method to convert the survey data, there is \( 0 \leq r_{ij} \leq 1 \), the worst value is 0, the optimal value is 1, and the normalized eigenmatrix is:

\[
R = \begin{pmatrix}
r_{11} & r_{12} & \cdots & r_{1n} \\
r_{21} & r_{22} & \cdots & r_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
r_{m1} & r_{m2} & \cdots & r_{mn}
\end{pmatrix}
\]

(3.3)

(2) Determination of index weight

According to the idea of entropy in system theory, how much information people get in decision making is one of the decisive factors of decision accuracy and reliability. Whether it is project evaluation or multi-objective decision, the amount of information contained in each index should be considered. However, in the actual process, due to a variety of reasons, the understanding of some indicators is not enough, but this does not indicate the importance of indicators. Therefore, information entropy theory is an ideal method based on this condition.

Entropy can be used to measure the amount of information. The more information transmitted by a certain index, the greater the influence of the index on preference. The entropy of the system \( H = (p_1, p_2, p_3, p_4, p_5, \ldots) \) and the entropy form of the system is as follows:

\[
H = \frac{1}{\ln m} \sum_{i=1}^{m} p_i \ln p_i
\]

(3.4)

Type in the (3.4), \( k = 1/\ln m \), \( m \) represents the number of schemes of the system, \( p_i \) represents the probability of some state of the system.

Combined with the formula of the standardized characteristic matrix (3.3) calculated previously, the entropy of the JTH index is:

\[
H_j = -k \sum_{i=1}^{m} f_{ij} \ln f_{ij} \quad (j = 1, 2, \ldots, n)
\]

(3.5)

Type in the (3.5), the entropy weight of the JTH index is:

\[
W_j = 1 - H_j / \sum_{i=1}^{n} 1 - H_i \quad (j = 1, 2, \ldots, n)
\]

(3.6)

The weight can reflect the role of different indexes in decision making. When the entropy value of an index is small and the entropy weight is large, it means that the index provides more useful information to decision-makers. Thus, the weight vector of the evaluation index is obtained:

\[
W = w^1, w^2, \ldots, w^n
\]

(3.7)

Then, according to the calculation, the respective index weights of the two information attributes are obtained, and the weighted average calculation is carried out to respectively obtain the preference level values of consumers for the two functions of food traceability, and then the numerical comparison is made to reach the conclusion.

Using EXCEL2016 edition to evaluate the related data of various measurement indexes of the two types of information attributes for 1116 interviewees, the standardized processing is carried out first, and then the weight of each measurement index of origin information and quality information is calculated according to the above formula, and the results are shown in Table 5.
Table 5. Weight of various information indicators

| Information property | Indicators                                                                 | Index weight |
|----------------------|---------------------------------------------------------------------------|--------------|
| 1. Origin information| 1. Check the manufacturer and country of origin information on food wrappers | 0.26         |
|                      | 2. When buying pork, do you first want to know where the pork comes from  | 0.26         |
|                      | 3. Do not know where pork comes from, whether can you feel unsteady        | 0.18         |
|                      | 4. Whether want to know the source of pork, in order to judge whether pork from the formal farms, slaughterhouses | 0.16         |
|                      | 5. Do you want to know the source of the pork, so that when there is a quality safety problem, it can be easy to take responsibility | 0.14         |
| 2. The quality of information| 1. Do you often get all kinds of useful knowledge and information through the media and apply it to your life | 0.18         |
|                      | 2. Want to obtain sufficient knowledge and information on food safety to improve identification and discrimination | 0.17         |
|                      | 3. Do you think the internal quality of food is very much in need of relevant information to judge | 0.20         |
|                      | 4. Check the ingredients, production date, and expiration date of the purchased food first | 0.16         |
|                      | 5. Do you want to know how pigs are raised and how they are raised to determine pork quality | 0.29         |

Source: collated according to statistical results

It can be seen from table 5 that according to the respective index weights of the two categories of attributes and combining with the choice of each index by 1116 consumers, the weighted average calculation shows that 239 people prefer the attribute of origin, 809 people prefer the attribute of quality, and 73 people prefer both the attribute of origin and the attribute of quality. It can be seen from the calculated results that consumers prefer to obtain quality information about pork as the basis for judging pork safety.

4.4 Data analysis

Table 6. Rotation component matrix

| Ingredients | 1 | 2 |
|-------------|---|---|
| 1. The first question | 542. | 308. |
| 2. The second question | 744. | 129. |
| 3. The third question | 771. | 138. |
| 4. The fourth question | 739. | 205. |
| 5. The fifth question | 665. | 263. |
| 6. The sixth question | 305. | 610. |
| 7. Number 7 | 266. | 758. |
| 8. The eighth question | -007. | 629. |
| 9. Question 9 | 262. | 747. |
| 10. The first ten questions | 423. | 588. |

Source: analyzed data according to SPSS

Table 7. Total variances explained

| Ingredients | Initial eigenvalue | Extract the sum of squares and load | Rotate sum of squares load |
|-------------|-------------------|------------------------------------|---------------------------|
|             | A combined | % of the variance | Cumulative % | A combined | % of the variance | Cumulative % | A combined | % of the variance | Cumulative % |
| 1           | 4.198    | 41.983          | 41.983       | 4.198    | 41.983          | 41.983       | 2.842    | 28.420          | 28.420       |
| 2           | 1.131    | 11.312          | 53.295       | 1.131    | 11.312          | 53.295       | 2.487    | 24.874          | 53.295       |
Table 8. Cross analysis of consumer information preference

|                                      | Preference for pork origin information | Prefer pork quality information | The two types of information have the same level of preference |
|--------------------------------------|----------------------------------------|--------------------------------|-------------------------------------------------------------|
|                                      | Statistic | Proportion | Statistic | Proportion | Statistic | Proportion |
| 1. Gender                            |           |            |           |            |           |            |
| Men                                  | 93        | 8.33%      | 279       | 25.00%     | 19        | 1.70%      |
| Women                                | 145       | 12.99%     | 527       | 47.22%     | 53        | 4.75%      |
| 2. Age                               |           |            |           |            |           |            |
| Under the age of 30, 31-35 years old | 87        | 7.80%      | 359       | 32.17%     | 27        | 2.42%      |
| 36-40 years old                      | 34        | 3.05%      | 124       | 11.11%     | 7         | 0.63%      |
| 41-45                                | 37        | 3.32%      | 119       | 10.66%     | 13        | 1.16%      |
| 46 years old of above                | 51        | 4.57%      | 134       | 12.00%     | 14        | 1.25%      |
| 3. Education level                   |           |            |           |            |           |            |
| High school and below                | 119       | 10.66%     | 363       | 32.53%     | 38        | 3.41%      |
| Specialized subject                  | 60        | 5.38%      | 205       | 18.37%     | 24        | 2.15%      |
| Undergraduate                       | 54        | 4.84%      | 220       | 19.71%     | 10        | 0.90%      |
| The master                           | 3         | 0.27%      | 16        | 1.43%      | 0         | 0.00%      |
| Doctor or above                      | 2         | 0.18%      | 2         | 0.18%      | 0         | 0.00%      |
| 4. Family monthly income level       |           |            |           |            |           |            |
| 5000 Yuan of the following           | 97        | 8.69%      | 282       | 25.27%     | 35        | 3.14%      |
| 5001-10000 Yuan                      | 92        | 8.24%      | 342       | 30.65%     | 27        | 2.42%      |
| 10001-15000 Yuan                     | 33        | 2.96%      | 108       | 9.68%      | 6         | 0.54%      |
| 15001-20000 Yuan                     | 9         | 0.81%      | 32        | 2.87%      | 2         | 0.18%      |
| More than 20000 Yuan                 | 7         | 0.63%      | 42        | 3.76%      | 2         | 0.18%      |
| 5. Are there elderly or children or pregnant women | 182 | 16.31% | 642 | 57.52% | 66 | 5.91% |
| No                                   | 56        | 5.02%      | 164       | 14.70%     | 6         | 0.54%      |

Source: analyzed data according to SPSS
5. Discussion on the results
From Table 6, the first factor explained 28.42% of the variance, mainly reflect consumer preferences of origin information, including "whether to check the manufacturer on purchased food wrappers and provenance information (X21), buy pork, if want to know where pork from first (X22), don't know where pork from, I will feel unreal (X23), whether to want to know the source of the pork, to decide whether the pork from the regular farms, slaughterhouses (X24), whether to want to know the source of the pork, so that the quality and safety problems, It can be easily blamed (X25), so it is named quality factor."

As can be seen from Table 7, the characteristic value corresponding to the first two principal components is greater than 1, and the cumulative contribution rate reaches 53.295%, basically retaining the information of the original index, so the first two principal components are extracted.

From Table 8, it can be seen that from the perspective of gender, both male consumers and female consumers prefer quality information in the proportions of 25.00% and 47.22%, far exceeding 8.33% and 12.99% respectively. From the perspective of age structure, consumers of all ages prefer the quality attribute of pork, and the preference for the origin attribute only accounts for 1/5 of the quality attribute. From the perspective of education level, with the growth of educational background, the ratio of consumers' preference for quality and preference for origin is decreasing. From the perspective of family monthly income level, the proportion of people of all income levels who prefer pork quality information is higher. According to the statistical results of whether there are old people, children or pregnant women in the family, the families with such people prefer the quality information attribute.

It can be seen that respondents pay much attention to the quality information of agricultural products. It is generally believed that it is easier to identify the quality and safety of pork by mastering effective quality information, which is regarded as the standard of purchase and confidence and represents a higher level of food quality and safety. And to a large extent, consumers' purchasing behavior decisions will be affected by quality information. The results of this study show that consumers have a strong preference for the quality attributes defined in this paper, which provides a clearer direction for the construction of traceability system.

6. The conclusion and the enlightenment
Based on existing research conclusion on the basis of analysis, from the function and mechanism of FTS, set up the origin and quality attribute two main variables, research on the food traceability system and verify the consumer information transmission mechanism, and according to the data from chengdu 1116 consumers by using factor analysis method and entropy weight method to validate and confirm the selection is closely related to the main component of production factor, quality factor can better reflect the consumers of food traceability two kinds of function of the overall level of preference; Compared with quality safety information as the basis for judging food safety, consumers prefer to take food traceability as a safety signal and indicator.

The study of this paper has the following important guidance for the establishment of long-term operation mechanism of food traceability system:

1. At present, the implementation effect of the pork traceability system is still not obvious, and consumers' willingness to pay for traceable food is far lower than that of certified food. It is suggested that the government strengthen the publicity of food traceability system to let more consumers know the benefits of traceability.

2. Producers directly convey quality and safety signals to consumers through food traceability, so as to enhance consumers' confidence in buying food safely and encourage more consumers to conduct food traceability.

3. Encourage enterprises to carry out reasonable and effective marketing activities to facilitate food safety and quality traceability by clarifying consumers' preference and demand for food traceability. It should be pointed out that although this paper takes pork traceability information as an example, its research conclusions still have important reference significance for the reform of food traceability system and the improvement of food safety market supervision mechanism.
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