

# A Review of Research on Factors Influencing Chinese Consumers' Healthy Food Purchases

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**Abstract.** The public's health awareness has increased substantially with the progress of society, food safety incidents are frequent, and the Chinese government has introduced a number of health-related policies, so it is necessary to study the influencing factors on consumers' purchasing of healthy food. This paper investigates the influencing factors on consumers' purchase of healthy food through literature analysis and finds that consumers' perception of healthy food significantly influences their purchase of healthy food through different dimensions. Perceptions are correlated with education, however, when consumers perceive that the health food market in China is not sufficiently safe and secure the higher their level of concern the lower their purchase rate. Purchasing habits and preferences, income level, type of occupation, and personal and family health conditions all have an impact on the purchase of healthy foods. Among product factors high prices are a major barrier to healthy food purchases. Government regulation of the food industry and consumer protection all have a strong effect on consumer purchases of healthy food. Characteristics such as the environment, convenience, trustworthiness and price level of the place of consumption also have an impact on the purchase of health food.

## 1 Introduction

With the development of economy and society as well as the improvement of people's material standard, the public is paying more and more attention to health. Human life and health are closely related to food, and the diversification of various types of food has made more people start to pay attention to the quality of food. Food safety is of great concern to the general public, and there have been numerous cases of such problems. Every year, the 3.15 Counterfeiting Gala exposes shady food products that cause ripples in society, such as 'pork with preserved mustard greens made from bad meat', 'fake sweet potato vermicelli', 'flavoured rice', and so on. Food safety incidents have made consumers distrustful of food.

China continues to improve and deepen its food safety policies, and attaches great importance to the safety of food production and food regulation, as well as to the health of the population. The 19th Party Congress made a major decision to implement the Healthy China Strategy and formulated the Healthy China Action (2019-2030). The report of the Twentieth National Congress of the Communist Party of China states that it will 'promote

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the construction of a healthy China and place the protection of people's health in the strategic position of priority development'. Consumers are becoming more health-conscious and are paying more attention to healthy food choices, so exploring such consumer decisions and behaviours has become an unavoidable topic. Therefore, this paper summarises the influencing factors of Chinese consumers' purchasing decisions and behaviours towards healthy food through combing and analysing the relevant domestic literature, to provide a referable research overview for future studies, and to provide opinions and suggestions for food marketing.

## **2 The meaning of healthy food**

The definition and standard of healthy food is still vague, and the definition of healthy food has not been unified at the level of domestic and foreign laws and regulations, but what can be referred to is that compared with ordinary food, healthy food adds more nutritional elements, removes harmful ingredients that are unfavourable to the human body or reduces their content. Healthy food comes from different food ingredients, which are made healthy through different processing techniques and different processing standards [1,2]. Natural, nutritionally balanced, low-calorie, low-salt, low-sugar, low-fat and safe, these characteristics make healthy food play a major role in maintaining human health. For example, it provides a variety of nutrients to promote the normal functioning of the body's systems, and also has the effect of preventing chronic diseases such as hypertension, diabetes, obesity, etc., which improves people's health and quality of life. Healthy food includes green food, organic food, genetically modified food and so on.

## **3 Internal factors**

### **3.1 Psychological factors**

#### *3.1.1 Cognition*

Cognition is a prerequisite for consumers to generate buying behaviour [3]. In a study on dairy purchasing it was shown that the higher the level of consumers' perception of dairy quality the more they preferred to choose more quality and safety assured dairy products and the level of perception of dairy quality and safety was the most important factor for rural residents to make a decision on the consumption of quality certified dairy products [4]. A foreign study also confirms this theory from the side, that is, "consumers' concern" about toxic chemical residues in food can influence the number of purchases more than consumers' attitudes towards organic products, food safety and the environment [5]. Some scholars have also studied from the perspective of the difference between consumption willingness and consumption behaviour that many consumers have a strong willingness to consume green food, but it cannot be effectively transformed into actual consumption behaviour. According to this scholar, this situation is mainly due to the asymmetry of quality information in the supply and demand relationship of green agricultural products, resulting in consumers not being able to accurately understand the real quality information of green agricultural products, which ultimately leads to market failure [6]. Some foreign scholars have pointed out that Chinese consumers do not have access to objective quality information, and that low intrinsic product credibility leads risk-averse consumers to rely on extrinsic cues to evaluate products and thus reduce perceived risk. However, as brand and shop information is more unreliable, the more risk averse and risk averse consumers are,

the more Chinese consumers use price as an indicator of food quality, creating a price-quality model [7].

The above study shows the importance of cognitive level in the purchase of healthy food. With the spread of knowledge Chinese consumers' awareness of healthy food has increased but there are still many shortcomings. Therefore, both the state and enterprises should strengthen the popularisation of healthy eating among the public and enhance the transparency of food information, so as to prevent consumers from abandoning the purchase of healthy food due to a lack of awareness or errors in the understanding of healthy food.

On the basis of this study, some scholars have made more in-depth studies. The food safety consumption behaviour of rural residents is significantly influenced by their level of awareness, but differs in the segmented dimensions. Both personal and territorial power perceptions enhance rural residents' food safety risk perceptions and thus their desire to consume, which in turn leads to a greater preference for safer food consumption behaviours. On the contrary, the cultural power perception is to reduce the perceived risk of rural residents thereby increasing their willingness to buy safe food and then prompting them to adopt food safety consumption behaviour [8]. Food safety risk perception is influenced by cognitive processes developed by individuals throughout their lives. The lower the perceived controllability and benefits of healthy foods, the higher the perceived food safety risk. The level of concern and preference for natural foods were also positively associated with their perceived food safety risk [9]. The high level of attention to green food responds to the high level of consumer awareness of green food [6]. Consumers' food safety risk perceptions are formed to further influence consumer choice and purchase intentions, with stronger food safety risk perceptions being associated with a decrease in choice and purchase intentions of approximately one-third [9]. This paper suggests that the reason for this situation is that as consumers' understanding of green food deepens, and the development of green food in China is not very perfect, consumers with a high level of understanding do not trust green food, so their willingness to buy decreases instead. Therefore, measures should be taken at both the national and corporate levels to enhance consumer trust in healthy foods, and purchase rates will increase as trust increases [6]. In another survey of consumers' perceptions of healthy foods, an interesting finding was made that That is, 88 per cent of the respondents in this study indicated that they were aware of green food, yet only 70 per cent of the respondents indicated that they considered green food to be different from ordinary food. In another survey of consumer perceptions of healthy foods, it was interesting to note that 88 per cent of the respondents in this study indicated that they were aware of green foods, yet only 70 per cent of the respondents indicated that they thought that green foods were different from regular foods. The reason for this phenomenon is that consumers do not have an accurate definition of green food and are misled by counterfeit products in the market [3]. In addition, there are foreign scholars in a survey of the Norwegian people to buy organic food found that consumers of ecological concerns and the acceptance of the political environment of the country of origin of organic food have a positive impact on consumer attitudes towards organic food, of which ecological concerns have the greatest impact [10].

### *3.1.2 Purchasing habits and preferences*

Consumers' consumption patterns and habits make up the frequency of food purchases, which will have a profound impact on the purchase of green food. And consumer satisfaction with food is the first major factor for consumers in making green food purchasing decisions [6]. According to the research results of many scholars, it can be seen that as long as consumers recognise the quality, nutrition, price and other food attributes of

the purchased food, then consumers will be satisfied with the purchased food and will repurchase this product in the future to form a consumption habit, and this habit will be maintained for a long time if there is no strong stimulus from external forces [6,11]. Some foreign scholars have also reached a similar conclusion in their research, that is, if consumers believe that the benefits they gain from a product or service are greater than the costs they sacrifice, they will be more satisfied and more willing to buy again. However, high customer satisfaction does not mean that customers are loyal to the food product; there are other mediators and moderators between satisfaction-loyalty. Customer satisfaction leads to higher levels of perceived Switching Costs(SC)(the time, money, mental and physical effort spent in moving from one service provider to another) and lower levels of perceived Alternative Attractiveness(AA)(the extent to which consumers perceive the alternative service provider as superior to the focal service provider, e.g., lower prices, better quality of service, more choices, faster deliveries, etc.), which in turn increases their loyalty. However, the moderating effect of AA on satisfaction-loyalty decreases when the mediating role of SC is considered [12]. Therefore, enterprises should improve the quality of products, the quality of services, and consumer satisfaction, so as to improve the SC perception, strengthen consumer loyalty to the product, increase the repurchase rate of the product, and develop short-term customers into long-term customers.

### **3.2 Individual factors**

In terms of education, as consumers become more educated, their probability of purchasing green food increases significantly [6,13]. Consumers with low educational attainment have some health beliefs but still cannot implement them well in their daily healthy diet [14]. However, in the few studies by scholars that have shown that educational attainment has little effect on healthy food purchases. In the study of factors influencing the willingness of rural people to consume quality certified dairy products, it was analysed that not all consumers with a high level of education choose to buy Good Agriculture Practice (GAP) certified dairy products [4]. Whereas differences in results may be due to differences in survey populations. Rural residents generally have lower incomes and cannot afford the high prices of certified foods, so some well-educated rural residents do not choose certified foods perhaps for personal financial reasons.

In terms of consumer occupations. Most scholars believe that consumer occupation has a great influence on consumer purchases of green food. Some scholars have even made a more detailed study that people working in the government are more inclined to buy green food due to their detailed knowledge of food policies [13]. However, a small number of scholars still believe that consumer occupation does not have a significant impact on this [4]. Comparing these two studies, it was found that the survey respondents of Dong Wanjun et al.'s study mainly focused on different locations such as supermarkets, farmers' markets and public places. Whereas MengYue's research survey focused on shopping malls with a high concentration of population. This paper argues that the level of consumer spending varies from place to place, and that consumers who shop in shopping malls generally have low incomes and are able to pay for higher-priced items. The effect of occupational category on willingness to buy healthy food in such a consumer environment may not be significant. Whereas consumers who spend their money in places such as supermarkets and farmers' markets have varying levels of income. Different occupations bring different perceptions to consumers, and the influence of occupation on consumer willingness is reflected in this consumer environment.

In terms of consumer income. Consumers' purchases of healthy foods are closely related to their personal income and increase with income, even increasing their willingness to

spend [13,15]. When incomes are low, consumers have health beliefs, but their health beliefs are not well acted upon for healthy eating due to financial constraints [16].

In terms of consumer health status. When consumers are weaker than healthy people, they are more inclined to buy green food [13,4]. However, in a study by XieYuntian et al. it was found that consumers' physical fitness was not enough to significantly influence consumers' purchases of green food [6]. This paper analyses the sample for this study and finds that the respondents in this sample are basically concerned about green produce to varying degrees. But the data shown in terms of trust is the opposite of concern. Less than one third of consumers trust green produce. Therefore, this paper argues that the reason why it was found in this study that individual consumers' physical fitness is unlikely to have an impact on the purchase of healthy food is because mistrust of green food exists in all groups regardless of the consumers' physical fitness.

In terms of age. Numerous scholars believe that when the age of consumers gradually increases, their willingness to buy green agricultural products will gradually decrease. There are a number of barriers to the mechanism by which older people's health beliefs are translated into healthy eating behaviours, resulting in this mechanism not being well realised. Compared with the traditional consumption concepts of the elderly, young people have stronger health consumption concepts and more environmental education and environmental concerns, so young people have a higher purchase rate of green food [6,16]. Including in the study of a foreign scholar also showed that the young group has a higher willingness to buy safe and secure food [15]. This paper argues that in addition to the different consumer attitudes of young people and young adults it is also related to personal finances. Contemporary Chinese seniors generally had low incomes in the social environments in which they lived when they were young, leading to low savings in old age, which discourages them from paying high prices for healthy foods.

## **4 External factors**

### **4.1 Environmental factors**

#### *4.1.1 Family environment*

In many related studies it has been shown that family factors also have a positive influence on the purchase of healthy food [4]. When there are minors, the elderly, or members with sub-health status in the family, consumers' health awareness will increase and they will pay more attention to the health of their family members, which will lead to an increase in their willingness to consume [4,6,14]. In a study on the consumption behaviour of omnivorous grains, the scholar showed that families with the 'three highs' were more likely to have in-depth information about omnivorous grains and were more inclined to consume them for the sake of their family members, and that the 'three highs' were more likely to consume omnivorous grains, and will ignore the high cost of purchasing groceries and the convenience of the purchasing process, i.e., consumers' health beliefs in this case act on their consumption behaviour of groceries through the impact on consumers' perceived value and subjective control [16].

From the above findings, it is clear that families with vulnerable groups are in greater need of healthy and safe food to help restore and maintain the health of their members than families without vulnerable groups. Therefore, when conducting health education for the public, emphasis should be placed on families with elderly people, pregnant women and children, so as to raise their health awareness and knowledge of healthy food, and to guide them to take action on a healthy diet.

#### **4.1.2 Consumer environment**

Environmental brightness has a positive effect on consumers' willingness to pay for foodstuffs. The higher the environmental brightness of the consumption place, the higher the consumer's perception of food safety and, consequently, the consumer's willingness to pay [17]. When the environment of the place of consumption is dim, consumers are less mentally alert and thus more inclined to unhealthy choices [18]. And also some scholars have made similar studies, consumers choose to buy green food in supermarkets because of the relatively spacious and bright shopping environment [14]. It can be seen that the marketing of food should also pay attention to the adjustment of environmental brightness, in order to give consumers a good sense of experience, and promote consumer food purchasing behaviour.

The characteristics of different places of consumption can also have an impact on consumers' food purchases. Some scholars have researched that most consumers choose to buy green food in supermarkets or at trade fairs and green expositions because these venues are characterised by a high degree of food credibility. The quality of green food in consumer places such as farmers' markets has certain hidden dangers and cannot be trusted enough by consumers, so only a small number of consumers will choose to consume green food in these places [14].

#### **4.2 Reference groups**

It has also been found in a large number of previous studies that subjective norms also play an important and non-negligible role in the process of making purchase decisions by consumers. Family expectations, referrals from friends, consumer trends, national development plans, etc. all play a subjective normative role [16]. And these are also the ways in which consumers seek information about food. Searching for information on food safety and quality is the main measure for consumers to reduce the risk of purchasing, thus increasing their willingness to purchase safe food [11]. At the same time, the varying levels of quality of information sought by consumers have a direct impact on their purchasing behaviour. Some scholars' research studies have found that in the process of searching for green food information, consumers obtain a larger amount of information from commercial information channels such as advertisements and manufacturers, and the smallest proportion is from friends' referral channels. Further analysis reveals that only 15.30 per cent of the cases were referred by friends. However, the purchase rate of green food among this group of consumers is actually as high as 98.82 per cent. The inference from this is that the higher the level of trust in the information, the higher the probability of purchase, even if the amount of information obtained by this route is low [14].

National policies, government regulation of the market and protection of consumers and their rights also have a significant positive impact on consumer health food purchases [13,11]. In a research study conducted by an academic in Mianyang City, it was found that the higher the local residents rated the municipal government's food regulation, the more strongly they purchased green food. This phenomenon reflects consumers' recognition of the effectiveness of government food regulation [13]. Some scholars have also worked out that government certification information, farming information, slaughtering and processing information, and distribution and marketing information all have a positive impact on consumers' purchase intention, with government certification information having the greatest impact [19]. The implementation of relevant policies also has a significant impact. The government's implementation of the relevant consumer policy regime will provide an in-depth understanding of consumers' overall consumption tendencies and

effectively guide them towards healthy consumption behaviour, a measure that will largely determine consumers' actual consumption behaviour [11].

### **4.3 Product factors**

Based on random utility theory, the process of purchasing food by consumers is essentially weighing food attributes [20]. Price is the most discussed factor in previous studies regarding the attributes of healthy food products, and the results show a high degree of consistency, i.e., the higher the price of the food product, the weaker the consumer's willingness to purchase it [15]. Some scholars even point to higher prices as the number one barrier to healthy food consumption [16]. A survey showed that the proportion of consumers willing to accept more than three times the price of ordinary food to buy green agricultural products is very small, less than one-tenth, and mainly high-income people. The premium for green produce is so high that most consumers do not have the income levels to pay such high prices and do not readily develop a consumer preference for such foods [6]. In addition to price attributes, other attributes have a significant impact on consumers making healthy food purchasing decisions. Some scholars point out that the internal attributes of food (safety, nutrition, health, sensory experience, etc.) are the fundamental drivers of food consumption demand. Consumers cannot directly infer the internal attributes of a food product when confronted with it, but need to use the external attributes of the food product (attributes of food quality testing indicators such as quality management systems, scientific testing records, and labelling of various types, and attributes of quality cues such as price, brand, producer, packaging, etc.) to infer its internal attributes[20]. Where consumers are relatively more focused on the quality and safety attributes of food products, and as long as the quality attributes can be accurately judged, then consumers will choose to buy the product that delivers the most value, and basic consumer information about food quality attributes is the basis for the formation of food consumption preferences [13,20,21]. And the importance of food certification labelling has also been studied. In a study on the effect of ambient brightness on consumer food consumption it was found that the strength of the effect of ambient brightness decreases or is even insignificant if the consumer is able to see the food certification labels [17]. In terms of food types, consumers are more risk averse to foods of animal origin (milk, meat, eggs, etc.) than to foods of vegetable origin (cereals, vegetables). The negative impact of consumer food safety risk perceptions on choice and purchase intentions is also enhanced when faced with hedonic foods. Consumer food safety risk perceptions of food products with shorter shelf life have less impact on choice and purchase intentions than those with longer shelf life [9].It may be because the longer the shelf life the more preservatives need to be added to the food and consumers generally believe that preservatives are harmful to the human body, so when confronted with the attribute of shelf life, consumers preferred foods with a shorter shelf life.

## **5 Conclusion**

As a result of the study, the paper draws the following conclusions.

Firstly, consumer health beliefs, trust in healthy food and willingness to purchase healthy food are positively correlated. The development of health food in China is still not perfect, which leads to the fact that the more consumers are concerned about health food, the less likely they are to purchase it. Increased perceptions of personal and geographic strength will increase consumers' perceived risk of food safety and thus their willingness to purchase healthy foods, while increased perceptions of cultural strength will reduce consumers' perceived risk and then facilitate consumers' purchasing behaviours. Increased

satisfaction and stronger purchasing habits will likewise increase the purchase rate of healthy foods.

Secondly, the price of healthy food is significantly negatively correlated with the purchase rate of healthy food. Consumers usually infer the internal attributes of a food product from its external attributes in order to judge whether the food product meets their needs and make a purchase decision. Consumers pay more attention to food quality attributes when food safety incidents occur.

Thirdly, the more trust there is in reference groups, the more consumers trust the information they receive from such groups, which in turn promotes consumer purchases. State and government regulation of the market and consumer protection have a significant positive impact on consumer purchases of healthy food.

Fourthly, the number of vulnerable groups in the household, the level of household income, and the environmental brightness of the place of consumption are positively correlated with the rate of purchase of healthy food. The probability of purchase increases substantially for consumers in consumer establishments that are highly credible and where the quality of the food sold is guaranteed.

Fifthly, personal income, age, education, consumer occupation and physical condition also have some influence.

In response to the above findings, this paper makes the following revelations.

Firstly, for enterprises, they should start from the production technology and process to reduce the production cost and thus the selling price, so as to reduce the gap between the price and the ability to pay. Enterprises should strengthen the positive image of the brand, to obtain a high degree of consumer trust, improve the service attitude to enhance consumer satisfaction, so that consumers form a habit of consumption, thereby increasing the probability of repeat business, long-term retention of customers. Companies should also strengthen the quality of the food they produce, use technology to increase the nutritional attributes of the food, gain official recognition and obtain certification labels. In terms of food packaging should be in line with the public aesthetics, in the first sight of consumers to see the food was attracted, while the label should not only indicate the certification mark, but also streamlined summary of the various attributes of the food, so that consumers access to information, so as to make a correct judgement on the food to make a purchase decision.

Secondly, for the state and the government, they should strengthen the monitoring of the food industry and further improve the relevant laws and regulations on food safety and healthy food to give consumers protection. And they can also make use of various channels to strengthen the relevant publicity and popularisation of science among the general public, so as to enhance consumers' knowledge of healthy food and raise their health awareness. The Government can also provide certain financial subsidies to families with disadvantaged groups and those with low incomes, so as to narrow the gap between the level of personal finances and the high prices of healthy food.

Thirdly, the paper argues that the impacts are not independent, but control and influence each other. Influencing factors are not static, but change over time. The results of the study should be analysed in relation to the context of the time, but also in relation to the characteristics of the group of the survey sample and the environment of the place in which the group is located, otherwise the results will be rather one-sided. The internal logic associated with the conclusions drawn in that article can be further explored in future research.

## References

1. B.G.Sun,H.L.Liu. Status quo of health food industry and transformation and development of food industry. *J Food Scien.Techn.***41**, 1-6(2023)



2. Y.F.Zhu, S.H.Kang, X.Y.Liu, et al. Application of high and new technology in the processing of natural products and their health foods. *Food Scien.***45**, 335-344(2024)
3. X.P.Zhou, K.F.Liu, S.Q.Fan, et al. Survey on green food cognition and purchasing behaviour. *Anhui Agricult.Sci.***39**, 9831-9832(2011)
4. Y.Meng, Research on the influencing factors of green food consumption behaviour in Daqing. *Mod. Bus.*,**15**, 9-10(2016)
5. E.Tsakiridou, K.Mattas, I.Tzimitra-Kalogianni. The influence of consumer characteristics and attitudes on the demand for organic olive oil. *J Intern.Food Agribus.Mark.***18**, 23-31(2006)
6. Y.T.Xie, L.B.Liu, X.W.Wang, et al. Research on consumption willingness of green agricultural products in the context of supply side structural reform--Taking Zhangjiakou City as an example. *Ecol.Econ.***34**, 117-121(2018)
7. K.Z.Zhou, C.Su, Y.Q.Bao, A paradox of price–quality and market efficiency: a comparative study of the US and China markets. *Intern.J.Resear.Mark.***19**, 349-365(2002)
8. X.J.Zou, J.N.Chen, H.Z.Wang, The influence of cognitive traits on rural residents' food safety consumption behaviour under the perspective of distributed cognitive theory. *J.Agricult.Forestr. Econ.Manag.***22**, 233-242(2023)
9. V.A.M.Nardi, R.Teixeira, W.J.Ladeira, et al. A meta-analytic review of food safety risk perception. *Food Contr.***112**, 107089(2020)
10. P.Honkanen, B.Verplanken, S.O.Olsen, Ethical values and motives driving organic food choice. *J. Cons.Behav. An Intern. Res.Rev.***5**, 420-430(2006)
11. J.H.Wang, S.Y.Wang, L.J.Han, A study of differences in rural food safety consumption attitudes, willingness and behaviour. *China Popul. Resour. Envir.***26**, 139-149 (2016)
12. S.H.W.Chuah, M.Marimuthu, J.Kandampully, et al. What drives Gen Y loyalty? Understanding the mediated moderating roles of switching costs and alternative attractiveness in the value-satisfaction-loyalty chain. *J.Retail.Cons.Serv.***36**, 124-136(2017)
13. W.J.Dong, C.H.Chen, Analysis of factors influencing urban residents' purchase of green food. *Anhui Agricult.Sci.***46**, 201-204(2018)
14. J.F.Zhu, N.Z.Chen, W.Z.Wang, Analysis of the consumption intention of rural residents in Hebei Province towards quality certified dairy products in the post-'Sanlu' period. *Econ.JW.***01**, 63-67(2011)
15. C.Zhang, J.Bai, T.I.Wahl, Consumers' willingness to pay for traceable pork, milk, and cooking oil in Nanjing, China. *Food Contr.***27**, 21-28(2012)
16. Y.X.Huang, X.Y.Zhang, M.J.Zhao, Health-driven mechanisms of consumption behaviour of miscellaneous grains - a micro study from eight provinces with main buckwheat production. *World Agricult.***10**, 57-69(2022)
17. Y.X.Leng, P.Qing, S.Sun, et al. Effects of environmental brightness on food consumption decisions: The mediating role of food safety perceptions. *Psychol.Sci.***43**, 705-711(2020)
18. D.Biswas, C.Szocs, R.Chacko, et al. Shining light on atmospherics: how ambient light influences food choices. *J.Mark.Res.***54**, 111-123(2017)
19. L.Wu, H.Wang, D.Zhu, et al. Chinese consumers' willingness to pay for pork traceability information—The case of Wuxi. *Agricult.Econ.***47**, 71-79(2016)
20. E.P.Wang, Z.F.Gao, A review and outlook of research on food quality attributes and their consumption preferences. *World Agricult.***07**, 17-24(2020)

21. J.A.Caswell, How labeling of safety and process attributes affects markets for food. *Agricult. Resour. Econ. Rev.* **27**, 151-158 (1998)