frontiers | Frontiers in Sustainable Food Systems

TYPE Original Research
PUBLISHED 11 September 2025
DOI 10.3389/fsufs.2025.1544401

Check for updates

OPEN ACCESS

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RECEIVED 13 December 2024
ACCEPTED 22 August 2025
PUBLISHED 11 September 2025
CORRECTED 13 October 2025

CITATION
Wei H, Li G, Liang X, Li Y and Huang Q (2025) Innovating agricultural marketing: credit codes as a new tool to boost sales of place-of-origin products.
Front. Sustain. Food Syst. 9:1544401.
doi: 10.3389/fsufs.2025.1544401

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Innovating agricultural marketing: credit codes as a new tool to boost sales of place-of-origin products

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Introduction: Merchants often use the place-of-origin as a promotional tool for regionally distinctive agricultural products, yet consumers face challenges verifying origin authenticity. Prior research has centered on detection technologies to build trust, neglecting merchant credibility's impact. This study explores the role of China's Credit Information Network (CIN) credit codes in consumer purchasing behavior, an unexplored area.
Methods: Three experiments, with student and general consumer participants, were conducted. Experiment 1 evaluated credit codes' direct effect on purchase intentions. Experiment 2 examined perceived brand authenticity's mediating role. Experiment 3 explored regulatory focus (promotion vs. prevention) as a moderator.
Results: Credit codes on packaging boost perceived brand authenticity, enhancing willingness to buy place-of-origin agricultural products. They have a stronger impact on prevention-focused consumers. These findings suggest that credit codes serve as effective tools in communicating credibility and authenticity, thereby influencing consumer purchasing decisions.
Discussion: This study validates credit codes as an effective credibility cue in agricultural product marketing, leveraging signaling theory to elucidate their role in fostering consumer trust. The findings highlight the importance of both credibility mechanisms at the merchant and system levels and technological verification tools. Practically, it supports wider credit code adoption in agricultural marketing and offers strategic insights.

KEYWORDS

credit code, place-of-origin agricultural products, credibility cue, brand authenticity, regulatory focus

1 Introduction

The place-of-origin serves as a natural label for the quality and characteristics of agricultural products (Li, 2022). High-value agricultural products are distinguished by the geographical conditions of their production areas, including climatic and soil factors (Suzuki, 2021). Variations in the place-of-origin result in significant differences in the quality, taste, nutritional value, and cultural connotations embedded within agricultural products. Consequently, the place-of-origin has emerged as a basis for the differentiation of agricultural products and a crucial factor for businesses to gain competitive advantages (Tootelian and Segale, 2004). Numerous place-of-origin products worldwide are favored by consumers, such

as the peaches from Pinggu, China (Zhao et al., 2022), and the pistachios from Bronte, Italy (Wilson et al., 2018). The place-of-origin has become an external signal that allows customers to infer the intrinsic value of agricultural products (Zhou and Gao, 2024). For businesses, labeling their agricultural products with the "place-of-origin" can help them obtain higher premiums. However, the market is frequently plagued by fraudulent issues such as counterfeit and inferior products, misrepresentation of quality, and the misuse of geographical indications for agricultural products (Suzuki, 2021). Consumers find it challenging to discern the authenticity of place-of-origin agricultural products when purchasing them. Many authentic place-of-origin agricultural products are subject to "free-riding," which erodes consumer trust in place-of-origin information and leads to the phenomenon of "bad money driving out good" in the market.

To address this issue in agricultural product sales, prior research has focused on the role of quality inspection and identification technology development for agricultural products in mitigating consumer information asymmetry (Inaba et al., 2022; Wang et al., 2024). Techniques such as Sherlock (Gootenberg et al., 2017; Ma and Ernest, 2020), stable isotope analysis (Suzuki, 2021), fluorescence spectroscopy (Li et al., 2024), and blockchain-based traceability systems (Son et al., 2021; Treiblmaier and Garaus, 2023) have been employed to trace the place-of-origin of agricultural products. Despite ongoing efforts, fraudulent activities, such as falsification of the place-of-origin and substitution of inferior products, remain persistent in the market (Mazarakioti et al., 2022). Ultimately, these issues boil down to a matter of human creditworthiness. The aforementioned studies have overlooked the credit challenges faced by various supply chain entities during the circulation of agricultural products.

Due to the limitation of direct contact between consumers and products in the online setting, the presence of labels serves as an important reference for them to judge product quality information (Kabaja et al., 2022). The credit code, a product of the CIN, has been applied in the credit supervision of enterprises involved in the circulation of traditional Chinese medicinal materials in Bozhou and seafood products from Rongcheng Shidao. After relevant government departments conduct credit assessments of various credit entities within the product supply chain and industry chain, the credit code appears on product packaging in the form of a QR code. By scanning the credit code, consumers can view the credit status of each enterprise involved in the supply chain of the product on their mobile devices. Leveraging blockchain technology, the credit code ensures that information from various entities is timestamped and uploaded to the blockchain, rendering it tamper-proof (Zhang et al., 2017). In China, the construction of the CIN has laid the foundation for the credit code (Li et al., 2017). Based on internet technology, the CIN integrates transaction information from e-commerce platforms, government commercial credit supervision information, and big data mining information from public network platforms through information fusion and data analysis. It establishes specific credit evaluation models, forms a commercial credit evaluation system using cloud computing technology, and builds a commercial credit network through credit asset operations (Zhang et al., 2017).

As it stands, the credit code is essentially a government-led initiative. By promoting the credit code, the government aims to establish a more transparent and reliable market ecosystem. However, when it comes to individual enterprises, their decision-making process regarding the adoption of the credit code centers primarily on whether it can effectively boost their sales. For consumers, especially for young consumers, labels on agricultural products and food are important because they reduce information asymmetry, thereby providing assurance for the safety of these products (Lunardo and Guerinet, 2007; Tessitore et al., 2020; Yuan et al., 2020). Then, does the display of the credit code on products serves as a declaration of the authenticity of the product's place-of-origin, thereby enhancing consumers' purchase confidence? This is undoubtedly the spillover effect that merchants adopting the credit code tool hope to achieve. This study focuses on the application of the credit code tool in the field of agricultural product consumption in China, exploring the role of presenting the credit code in enhancing consumers' (including young consumers and general consumers') purchase intentions for agricultural products. It provides a theoretical basis for the promotion of the credit code in agricultural product marketing and offers insights for related enterprises in agricultural product sales.

2 Literature review and research hypotheses

2.1 Credit code and place-of-origin agricultural product purchase

Signaling theory is employed to elucidate issues such as information asymmetry and adverse selection in markets (Keeler, 1976). Signals exhibit both a transmission effect and a guarantee effect. The transmission effect of signals refers to the influence that information conveyed by senders through their actions or signals has on receivers' understanding and responses, thereby impacting market prices, product quality, corporate reputation, and other aspects (Akerlof, 1978). The guarantee effect of signals, on the other hand, involves senders providing receivers with assurances or guarantees through their actions or signals to enhance receivers' trust and acceptance of the information (Kivetz et al., 2006; Bandiera and Rasul, 2006).

In the highly homogeneous agricultural product industry, place-of-origin information creates a unique identity for agricultural products and, to a certain extent, serves as an indicator of product quality assurance (Balestrini and Gamble, 2006; Berry et al., 2015; van Ittersum et al., 2003). However, the varying quality of specialty agricultural products from distinct origins available in the market today has diminished consumer trust in place-of-origin information. The application of credit codes in the agricultural product industry allows consumers to promptly access information about the stakeholders involved in the cultivation, breeding, processing, packaging, storage, and other stages of agricultural products when purchasing. This, to some degree, enhances consumers' trust and confidence in the place of origin of agricultural products. Signals possess a transmission effect; the information recorded in credit codes can bolster consumers' understanding of the creditworthiness of various entities in the agricultural product supply chain, thereby reducing information asymmetry (Lee et al., 2005). This, in turn, lowers consumers' perceptions of uncertainty regarding agricultural products from specific origins and increases their willingness to purchase such products. Signals also exhibit a guarantee effect. The credit of entities within the agricultural product supply chain possesses a guarantee function (Li et al., 2022). The credit code conveys credit

report information that has been authoritatively certified by the Chinese government, which, to a certain extent, strengthens consumers' trust in the place of origin of agricultural products, thereby enhancing their willingness to purchase products from that origin.

Credit codes are presented on agricultural product packaging in the form of QR codes. As a tangible manifestation of certification by government authorities, the display of credit codes alone is sufficient to attract consumers' attention and facilitate the establishment of their trust in the product and its place-of-origin information. Even if consumers do not actively scan the credit code, its mere presence serves as a notable credential cue. This signal, as an implicit endorsement by all participants in the agricultural product supply chain regarding the authenticity of product quality and place-of-origin information, effectively triggers consumers' trust mechanisms. Based on this, the following hypothesis is proposed:

> *H1*: Presenting credit codes increases consumers' purchase intentions for place-of-origin agricultural products.

2.2 The mediating role of perceived brand authenticity

Based on signaling theory, when information asymmetry exists in the market, consumers tend to rely on various signals to infer the true quality and place-of-origin of agricultural products (Eliashberg and Robertson, 1988). In particular, for agricultural products with distinctive places-of-origin, consumers not only demonstrate a positive willingness to pay a price premium for such products (Yu et al., 2024), but also generally exhibit a high degree of concern for the authenticity of the place-of-origin information. This concern stems from their value recognition of the product's place-of-origin and their apprehension about purchasing products with falsely labeled origins.

The authenticity of agricultural product brands associated with their place-of-origin emphasizes the continuity of aspects such as brand originality, heritage, quality commitment, and naturalness (Bruhn et al., 2012). In this context, credit codes, as indicators of corporate credibility, effectively alleviate consumers' doubts about the authenticity of the agricultural products' place-of-origin, thereby enhancing their trust in the product brand. Consumers' perceived brand authenticity, in turn, has a positive impact on their purchase intentions (Oh et al., 2019; Fritz et al., 2017). Based on the above analysis, the following hypothesis is proposed:

> *H2*: Perceived brand authenticity play a mediating role in this relationship, such that the presentation of credit codes increases purchase intentions for place-of-origin agricultural products by enhancing consumers' perceived brand authenticity.

2.3 The moderating role of regulatory focus

Regulatory focus refers to the specific manner or tendency exhibited by individuals during the self-regulatory process of goal attainment. Rooted in human needs for self-actualization and safety, it distinguishes between promotion focus and prevention focus as two distinct motivational orientations (Higgins, 1997). The prevention focus centers on avoiding potential losses and fulfilling obligations, emphasizing safety needs and risk aversion. In contrast, the promotion focus emphasizes the pursuit of potential gains and the satisfaction of desires (Summerville and Roese, 2008; Lee et al., 2010).

Regarding the quality of agricultural products, consumers with different regulatory orientations exhibit differentiated attitudes toward signals of place-of-origin. Compared to prevention-focused consumers, promotion-focused consumers are more innovative, independent, and profit-oriented, demonstrating greater autonomy in purchasing decisions. Conversely, prevention-focused consumers are more attentive to risks and losses, often relying on additional cues to mitigate potential losses (Higgins et al., 2001; Friedman and Forster, 2001; Herzenstein et al., 2007). For prevention-focused consumers, who tend to be more informationally conservative, discerning the authenticity of the agricultural product's "place-of-origin" is crucial when making purchasing decisions, as it directly relates to their perception of product safety. Driven strongly by safety needs, these consumers tend to rely on additional verification methods, such as confirming the credit information of various stakeholders in the agricultural product supply chain, to enhance their trust in the authenticity of place-of-origin agricultural products. In contrast, promotion-focused consumers prioritize potential benefits when making decisions, exhibiting a certain risk-taking bias. Even when faced with risks, they are more inclined to pursue potential gains (Chernev, 2004; Molden and Finkel, 2010), and are relatively less sensitive to negative incidents related to the place of origin. Given this, the present study hypothesizes that a credit code, as a form of credit cue, can more effectively satisfy the information verification and security needs of prevention-focused consumers, thereby promoting their perception of the authenticity of agricultural product brands. The hypothesis proposed is:

> *H3*: Regulatory focus moderates the relationship between the presentation of credit codes and consumers' purchase intentions for place-of-origin agricultural products. Compared to promotion-focused consumers, prevention-focused consumers exhibit a stronger perceived brand authenticity after place-of-origin agricultural products are presented with credit codes, which subsequently positively influences their purchase intentions for those products.

3 Materials and methods

This study employs experimental methods to test the aforementioned hypotheses. Figure 1 illustrates the research framework. Experiment 1 initially examines the impact of presenting credit codes on consumers' purchase intentions for place-of-origin agricultural products. Experiment 2 investigates the mediating role of perceived brand authenticity. Experiment 3 further explores the moderating role of regulatory focus.

Prior to the commencement of the formal experiments, we determined the experimental materials through a survey. In China, products originating from Xinjiang are well-renowned. However, in recent years, counterfeit and inferior incidents involving agricultural products from Xinjiang, such as Aksu apples and Korla fragrant pears, have caused consumers to have numerous concerns about the authenticity of the place of origin of regional specialty agricultural products. Therefore, selecting agricultural products originating from Xinjiang as the experimental materials in this study is representative.

To determine specific products, we recruited 60 undergraduate students (44.20% male, M_{age} = 21.90, SD = 1.231) from a university in Beijing to conduct a survey. The survey was conducted in two phases. Firstly, each participant was asked to write down the three agricultural products originating from Xinjiang that they were most familiar with on a blank sheet of paper. Based on the frequency of mentions, the top six agricultural products were identified, namely, Hami melon, Turpan grapes, Korla fragrant pears, Xinjiang long-staple cotton, Hetian jujubes, and Xinjiang wolfberries. Subsequently, participants' familiarity with these six agricultural products was measured (Kent and Allen, 1994; 7-point Likert, 1 = very unfamiliar, 7 = very familiar). We selected Hami melon, Korla fragrant pears, and Xinjiang long-staple cotton, which had the highest levels of consumer familiarity, as the official experiment materials.

In the design of the formal experiments, we ensured the robustness of the credit code effect by diversifying the data sources. We considered the match between the place-of-origin agricultural products and the consumer groups, as well as the daily nature of the product types purchased in both online and offline experiments. Since Experiments 1 and 2 were both conducted offline at school, purchasing fruit on campus is a common and everyday activity for students, which makes these experiments more ecologically valid. Specifically, in Experiment 1, we selected MBA students as participants and Hami melon as the experimental material. MBA students generally have relatively higher purchasing power. Hami melon, with its relatively high unit price and volume, aligns well with the consumption characteristics of this group. In Experiment 2, we chose undergraduate students and Korla fragrant pears. Pears are a widely accepted and frequently purchased fruit, making them an ideal match for this participant cohort. By using pears, we could effectively investigate the mediating role of perceived brand authenticity in a context that is familiar and relevant to undergraduate students. Given that long-staple cotton is a highly processed agricultural product with a broader consumer base in China, we opted to use the Credamo platform to randomly select a wider and more diverse sample for Experiment 3. Credamo's sample library covers over 3 million participants across the country, it has completed over 220,000 research projects, and served over 3,000 universities and 4,000 enterprises. This significantly enhanced the applicability of our study. In all three experiments, participants were surveyed regarding their recognition of the experiment products. All participants correctly identified these products as distinctive agricultural products of Xinjiang.

4 Experiment 1

4.1 Participants and procedure

Experiment 1 examined the impact of presenting credit codes on consumers' purchase intentions for place-of-origin agricultural products. A total of 108 MBA students (36.111% male, M_{age} = 32.056, SD = 5.920) from a university in Beijing participated in this experiment. After being randomly assigned to either the experimental group (with credit codes) or the control group (without credit codes), all participants read the same introduction about the Hami melon. However, when the product images were presented subsequently, the control group saw Figure 2A, which depicted the place-of-origin agricultural product packaging labeled as a specialty of Xinjiang without any credit code; whereas the experimental group saw Figure 2B, which included a QR code, and read an explanation regarding it code as a carrier of credit information. Finally, participants responded to their purchase intentions using a 7-point Likert scale (Baker and Churchill Jr, 1977; 1 = extremely unwilling, 7 = extremely willing; Cronbach's α = 0.873).

4.2 Results and discussion

4.2.1 Descriptive statistical analysis

As shown in Table 1, with-code group and without-code group exhibited a high degree of similarity in age ($M_{with\ code}$ = 31.352, $M_{without\ code}$ = 32.759). However, there were some differences in gender distribution: the proportion of males was higher in the with-code group than in the without-code group ($P_{with\ code}$ = 44.444%, $P_{without\ code}$ = 27.778%). We conducted a regression analysis to examine whether this between-group difference would lead to varying effects on the dependent variable (purchase intention). The results showed that gender had no significant effect on purchase intention in either the with-code or without-code group ($\beta_{with\ code}$ = −0.122, SD = 0.331, t = −0.369, p = 0.713; $\beta_{without\ code}$ = −0.268, SD = 0.478, t = −0.562, p = 0.577).

4.2.2 ANOVA analysis

An analysis of variance (ANOVA) was conducted with consumers' purchase intentions as the dependent variable and the presentation of credit codes (0 = without, 1 = with) as the independent variable. As

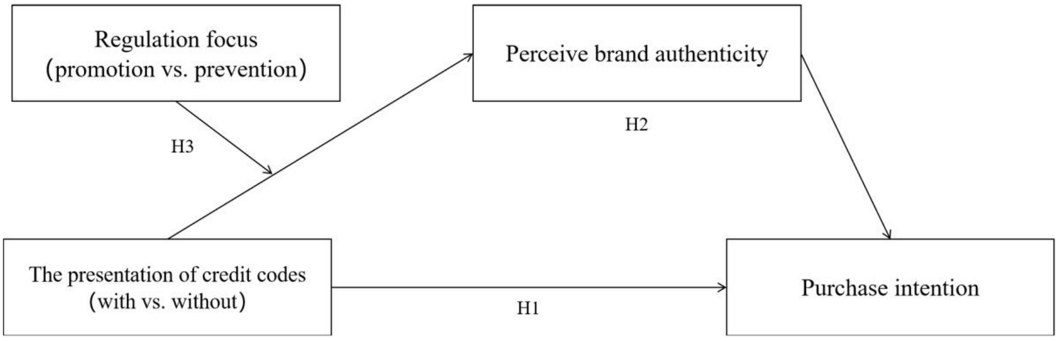

FIGURE 1
Research framework.

FIGURE 2
Experimental materials for Experiment 1. **(A)** Shows the control group materials (without code), and **(B)** shows the experimental group materials (with code).

illustrated in Figure 3, the presentation of credit codes significantly enhanced consumers' purchase intentions for place-of-origin agricultural products ($M_{with\ code}$ = 4.932, SD = 1.198; $M_{without\ code}$ = 3.784, SD = 1.562; $F(1, 106) = 18.363$, $p < 0.001$), thereby validating H1.

5 Experiment 2

5.1 Participants and procedure

Experiment 2 examined the mediating role of perceived brand authenticity, employing a single-factor design with the manipulation of presenting credit codes (with vs. without). A total of 124 undergraduate students (34.678% male, M_{age} = 21.686, SD = 1.422) from a university in Beijing were recruited to participate. The procedural steps followed those of Experiment 1. Participants were randomly assigned to groups and provided with an introduction to Korla fragrant pears.

Subsequently, the manipulation of presenting credit codes was conducted. Participants in the experimental group viewed product images as Figure 4B. accompanied by an explanation to ensure they correctly understood the QR code as credit code. The control group only saw the product images without a credit code, as shown in Figure 4A. The measurement items for purchase intention were consistent with those used in Experiment 1 (Cronbach's α = 0.900). The scale for perceived brand authenticity adopted the design by Bruhn et al. (2012) and Fritz et al. (2017), consisting of 15 measurement items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree, Cronbach's α = 0.968).

5.2 Results and discussion

5.2.1 Descriptive statistical analysis

As shown in Table 2, with-code group and without-code group exhibited a high degree of similarity in age ($M_{with\ code}$ = 21.129, $M_{without\ code}$ = 22.242). However, the proportion of males was higher in the with-code group than in the without-code group ($P_{with\ code}$ = 37.097%, $P_{without\ code}$ = 32.258%). Since there was a difference in gender distribution between the with-code and without-code groups, we also conducted a regression analysis to examine whether this between-group difference would lead to varying effects on the dependent variable (purchase intention). The results showed that gender had no significant effect on purchase intention in either the with-code or without-code group ($\beta_{with\ code}$ = 0.036, SD = 0.227, t = 0.157, p = 0.875; $\beta_{without\ code}$ = −0.258, SD = 0.402, t = −0.641, p = 0.524).

5.2.2 ANOVA analysis

In Figure 5, the results of ANOVA indicate that presenting credit codes significantly increases consumers' purchase intentions for place-of-origin agricultural products compared to when credit codes are not presented ($M_{with\ code}$ = 5.935, SD = 0.855; $M_{without\ code}$ = 5.409, SD = 1.474; $F(1, 122) = 5.926$, p = 0.016), reaffirming H1.

5.2.3 Mediation analysis

According to the Bootstrapping method proposed by Preacher and Hayes (2004) and Zhao et al. (2010) for mediation analysis, as illustrated in Figure 6, the presentation of credit codes exhibits a significant positive effect on perceived brand authenticity, with β = 0.455 (95% CI, $LLCT$ = 0.050, $ULCI$ = 0.860). Furthermore, perceived brand authenticity demonstrates a significant positive influence on purchase intentions, with β = 0.477 (95% CI, $LLCT$ = 0.307, $ULCI$ = 0.647). The mediation effect of perceived brand authenticity is significant, amounting to 0.217 (95% CI, $LLCT$ = 0.023, $ULCI$ = 0.476), thus confirming H2.

6 Experiment 3

6.1 Participants and procedure

Experiment 3 aimed to validate the moderating role of regulatory focus in the relationship between the presentation of credit codes and consumers' purchase intentions for place-of-origin agricultural products. Adopting a 2 (credit code: with vs. without) × 2 (regulatory focus: promotion vs. prevention) factorial design, this experiment randomly recruited a total of 160 Chinese participants (39.375% male, M_{age} = 33.107, SD = 9.270) from a professional online survey company

TABLE 1 Demographic characteristics of participants in Experiment 1.

Demographic variables		With-code group		Without-code group	
		Number	Percentage	Number	Percentage
Gender	Male	24	44.444%	15	27.778%
	Female	30	55.556%	39	72.222%
Age	Mean value	31.352		32.759	

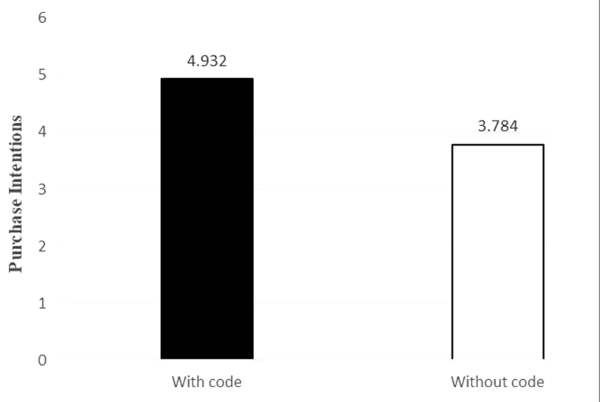

FIGURE 3
The impact of presenting a credit code on purchase intention.

in China (Credamo.com). Compared to Experiments 1 and 2, Experiment 3 featured a sample that was more representative of the general consumer population, thus enhancing the generalizability of the findings to the broader consumer market.

Xinjiang long-staple cotton was utilized as the experimental material. The experimental manipulation was consistent with Experiments 1 and 2, with Figure 7B depicting the experimental material with a credit code presented, and Figure 7A without. The measurement items for purchase intention (Cronbach's α = 0.931) and perceived brand authenticity (Cronbach's α = 0.976) were identical to those used in Experiment 2. The measurement of regulatory focus was based on the designs of Higgins (2002) and Xu et al. (2023), utilizing 8 items on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree, Cronbach's α = 0.763). Following the research of Higgins et al. (2001), Friedman and Forster (2001), and Herzenstein et al. (2007), the final regulatory focus score was calculated by subtracting the total prevention-focused score from the total promotion-focused score. Participants were categorized as promotion-focused or prevention-focused based on their scores, with the median serving as the cutoff point. Those scoring above the median were labeled as promotion-focused, while those scoring below the median were labeled as prevention-focused.

6.2 Results and discussion

6.2.1 Descriptive statistical analysis

As shown in Table 3, with-code group and without-code group exhibited a high degree of similarity in age ($M_{with\ code}$ = 33.113, $M_{without\ code}$ = 33.100), and the two groups also showed a high degree of similarity in terms of monthly income distribution. However, there were some differences in gender distribution: the proportion of males was higher in the with-code group than in the without-code group ($P_{with\ code}$ = 45.000%, $P_{without\ code}$ = 33.750%). We conducted a regression analysis to examine whether this between-group difference would lead to varying effects on the dependent variable (purchase intention). The results showed that gender had a significant differential effect on purchase intention between the with-code and without-code group ($\beta_{with\ code}$ = 1.044, SD = 0.351, t = 2.971, p = 0.004; $\beta_{without\ code}$ = 0.213, SD = 0.169, t = 1.260, p = 0.212).

This result reflects a phenomenon: when long-staple cotton adopts the credit code, men's purchase intention increases significantly compared to that of women. However, interestingly, for agricultural products such as Hami melons and Korla fragrant pears, in the group with credit codes, there is no significant difference in purchase intention between men and women. This may be attributed to the differences in the purchase decision-making processes between men and women when purchasing different types of products. Purchasing consumable products like fruits, the information requiring comparison is straightforward and largely homogeneous. However, when acquiring durable goods such as long-staple cotton, men can accelerate the decision-making process and boost their purchase motivation by relying on the credit code; whereas women are inclined to take into account a broader array of factors.

To mitigate potential confounding effects from demographic variables such as gender, age, and monthly income, we will incorporate these factors as control variables in our subsequent mediation effect analysis and moderated mediation effect analysis.

6.2.2 ANOVA analysis

As shown in Figure 8. The results of the one-way ANOVA indicate that, for consumers, products with a code evoke a stronger purchase intention compared to those without a code ($M_{with\ code}$ = 6.092, SD = 1.639; $M_{without\ code}$ = 5.667, SD = 0.717; $F(1, 106)$ = 4.516, $p < 0.05$). Thus, reaffirming H1.

6.2.3 Mediation effect analysis

According to the Bootstrapping method proposed by Preacher and Hayes (2004) and Zhao et al. (2010) for mediation analysis, We include gender, age, and monthly income as control variables in the model. as illustrated in Figure 9, the presentation of credit codes exhibits a significant positive effect on perceived brand authenticity, with β = 0.379 (95% CI: $LLCT$ = 0.027, $ULCI$ = 0.731). Furthermore, perceived brand authenticity demonstrates a significant positive influence on purchase intentions, with β = 0.919 (95% CI: $LLCT$ = 0.822, $ULCI$ = 1.015). The mediation effect of perceived brand authenticity is significant, amounting to 0.348 (95% CI: $LLCT$ = 0.051, $ULCI$ = 0.690), thus reaffirming H2.

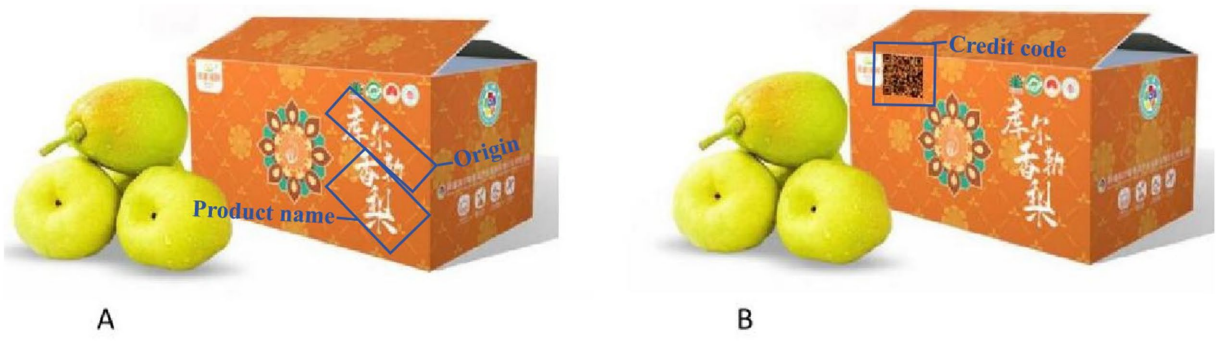

FIGURE 4
Experimental materials for Experiment 2. **(A)** Shows the control group materials (without code), and **(B)** shows the experimental group materials (with code).

TABLE 2 Demographic characteristics of participants in Experiment 2.

Demographic variables		With-code group		Without-code group	
		Number	Percentage	Number	Percentage
Gender	Male	23	37.097%	20	32.258%
	Female	39	62.903%	42	67.742%
Age	Mean value	21.129		22.242	

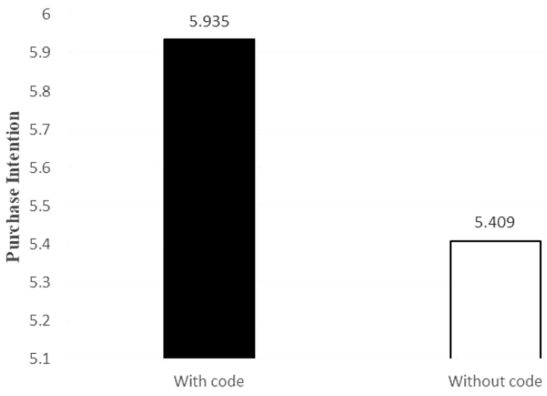

FIGURE 5
The impact of presenting a credit code on purchase intention.

6.2.4 Moderated mediation analysis

The interaction between the presence versus absence of credit codes and regulatory focus (promotion vs. prevention) has a significant impact on perceived brand authenticity ($F(3, 156) = 6.831$, $p < 0.01$), as illustrated in Figure 10. For consumers with a prevention focus, the presentation of credit codes significantly influences their perceived brand authenticity toward place-of-origin agricultural products ($M_{with\ code} = 5.996$, $SD = 0.774$; $M_{without\ code} = 5.183$, $SD = 1.667$; $F(1, 78) = 7.419$, $p = 0.008$). However, for consumers with a promotion focus, the effect of presenting credit codes is not significant ($M_{with\ code} = 5.998$, SD = 0.725; $M_{without\ code} = 6.099$, SD = 0.902; $F(1, 78) = 0.306$, $p = 0.582$).

Following the methodology outlined by Hayes (2015), a Bootstrapping approach was employed to test the moderated mediation effect. Model 7 was used, with the number of bootstrap samples set to 5,000 and a 95% confidence interval selected，and we include gender, age, and monthly income as control variables The results are presented in Table 4. For consumers with a prevention focus, the presentation of credit codes has a significant positive impact on purchase intentions for place-of-origin agricultural products by enhancing perceived brand authenticity (β = 0.645, *LLCT* = 0.174, *ULCI* = 1.159). In contrast, for consumers with a promotion focus, the effect of credit codes is not significant (β = −0.009, *LLCT* = −0.341, *ULCI* = 0.356). Thus, H3 is supported.

7 Discussion and conclusion

In China, credit codes have been applied to credit supervision in agricultural products, yet no research has validated the impact of presenting credit codes on consumer behavior. In the industry of regional specialty agricultural products with high premiums for place-of-origin information, this study uses experimental methods to verify the positive impact of presenting credit codes, as a form of credit cue, on purchase intentions for specialty place-of-origin agricultural products. Compared with previous methods such as stable isotope analysis (Suzuki, 2021), fluorescence spectroscopy (Li et al., 2024), and blockchain-based traceability systems (Son et al., 2021; Treiblmaier and Garaus, 2023), the credit code in this study possess the advantage of visualization, which enables a broad range of consumers, even those with limited knowledge of new technologies, to quickly receive this signal. In this process, presenting credit codes to consumers enhances their perceived brand authenticity, thereby increasing their purchase intentions for these specialty products. Additionally, this study validates the moderating role of regulatory focus (promotion vs. prevention). Compared to consumers with a promotion focus, the presentation of credit codes has a more significant positive effect on the purchase intentions of consumers with a prevention focus.

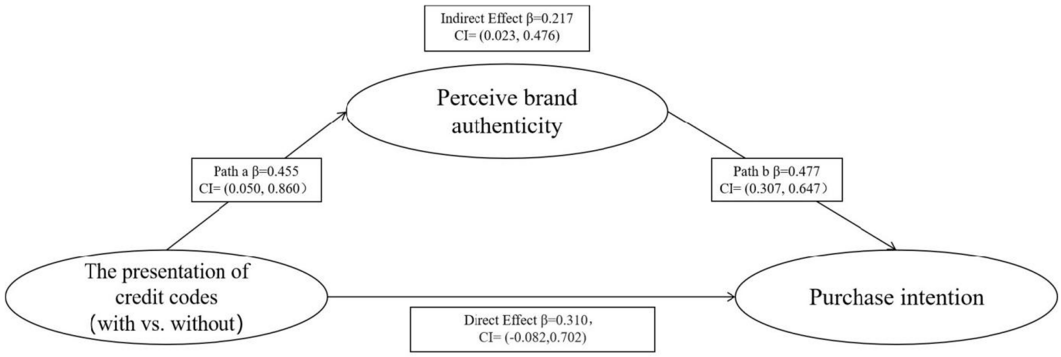

FIGURE 6
Mediating effect of perceived brand authenticity.

FIGURE 7
Experimental materials for Experiment 3. **(A)** Shows the control group materials (without code), and **(B)** shows the experimental group materials (with code).

TABLE 3 **Demographic characteristics of participants in Experiment 3.**

Demographic variables		With-code group		Without-code group	
		Number	Percentage	Number	Percentage
Gender	Male	36	45.000%	27	33.750%
	Female	44	55.000%	53	66.250%
Monthly income	<¥3,000	14	17.500%	15	18.750%
	¥3,001–¥6,000	11	13.750%	11	13.750%
	¥6,001–¥9,000	16	20.000%	19	23.750%
	¥9,001–¥12,000	15	18.750%	10	12.500%
	¥12,001–¥15,000	12	15.000%	13	16.250%
	>¥15,001	12	15.000%	12	15.000%
Age	Mean value	33.113		33.100	

7.1 Research and managerial implications

Firstly, in terms of theoretical contributions, this study employs the transmission and guarantee effects of signaling theory to elucidate the impact of presenting credit codes on consumers' purchase intentions for place-of-origin agricultural products, thereby broadening the application of signaling theory within the realm of consumer behavior. Secondly, prior research on brand authenticity has predominantly focused on corporate brands, with relatively limited exploration of place-of-origin brands. The present study enriches the application of brand authenticity theory to place-of-origin agricultural products. Thirdly, by examining the differences in perceived brand

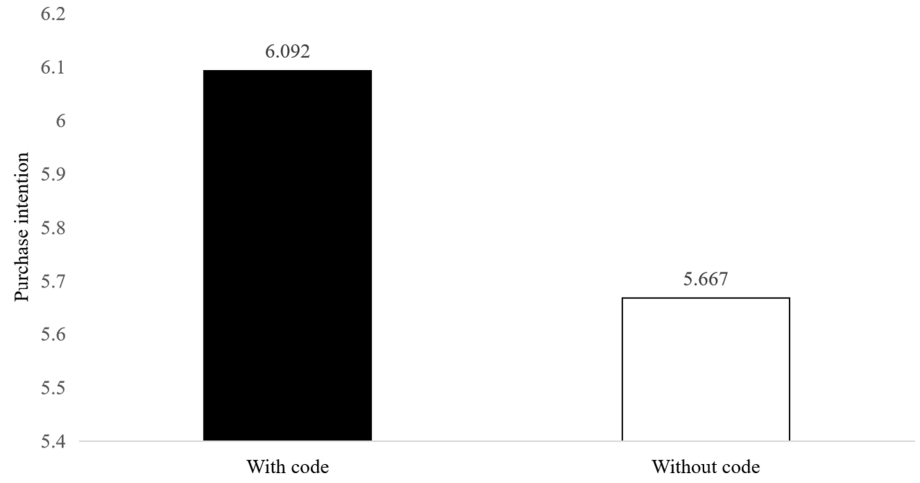

FIGURE 8
The impact of credit code on purchase intention.

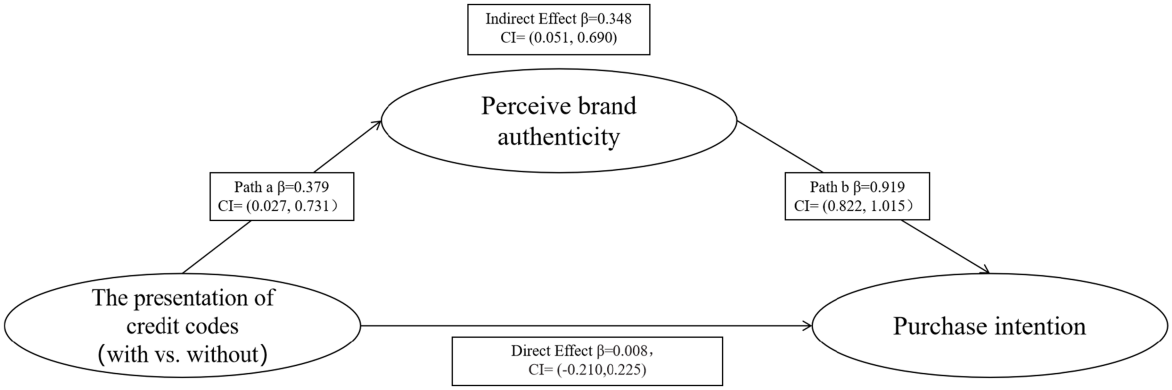

FIGURE 9
The mediation effect of perceived brand authenticity.

authenticity among consumers with varying regulatory orientations in the context of agricultural products with or without credit codes, this study contributes to the literature on regulatory focus.

Regarding practical contributions, maintaining the place-of-origin label for agricultural products cannot solely rely on traditional promotional strategies; effective tools are also necessary. This study demonstrates that credit codes, as a highly efficient tool, are of great significance in enhancing consumers' perceptions of the authenticity of place-of-origin agricultural products. Especially in the current context where trust in the origin of agricultural products faces challenges, credit codes, as a crucial signaling medium, can significantly bolster consumers' trust in specialized place-of-origin agricultural products, making their promotional value self-evident. By integrating credit codes onto agricultural product packaging, consumers can instantly access credit information from all participants in the supply chain. This innovative application is not only applicable to traditional sales channels such as supermarkets and wholesale markets but can also be integrated into emerging business models like live streaming sales and cross-border trade, showcasing its broad applicability. Furthermore, this study offers targeted recommendations based on consumer heterogeneity, suggesting that for consumers with a prevention focus, the presence of credit codes should be more prominently featured in the promotion and advertising of place-of-origin agricultural products to more effectively reach and influence their purchase decisions. This finding provides insights for the formulation of marketing strategies for agricultural products.

Affirmatively, the credit code, a QR code label generated through blockchain technology with tamper-proof effects, is strongly promoted by the government. This will help protect high-quality merchants and alleviate the phenomenon of "bad money drives out good" in the market (Zhang et al., 2017). However, a dialectical analysis of the application of credit codes reveals potential challenges. The costs associated with generating and maintaining credit codes could pose a financial burden for smaller merchants, potentially exacerbating inequalities within the market. Therefore, while the credit code represents a promising step forward in addressing counterfeiting and protecting consumer rights, its successful implementation requires a comprehensive approach that addresses these potential pitfalls.

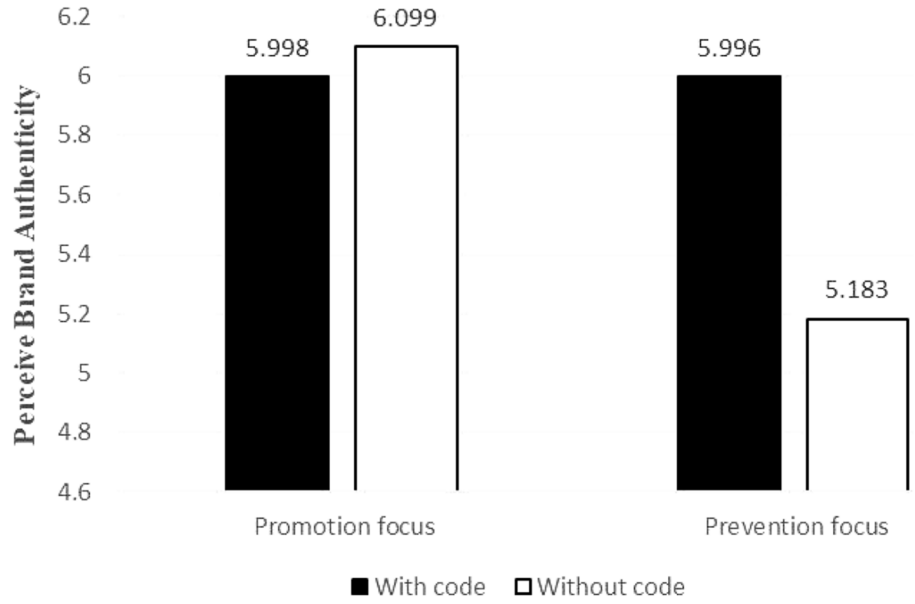

FIGURE 10
The impact of presenting a credit code on perceived brand authenticity.

TABLE 4 Test of moderated mediation effect.

Path	Moderator variable	Effect	Se	LLCI	ULCI
The presentation of credit codes → perceive brand authenticity → purchase intention	Prevention focus	0.645	0.252	0.174	1.159
	Promotion focus	−0.009	0.173	−0.341	0.356

7.2 Limitations and direction for future research

This study holds both theoretical significance and practical value, but there are also some limitations. Specifically, future research can be conducted in the following aspects.

Firstly, in terms of sample selection, while this study represents an early exploration of the role of credit codes in the field of distinctive agricultural products, the sample size was inevitably limited. Future in-depth studies can expand the sample size to include more finely stratified participants, thereby enhancing the robustness and applicability of the research findings.

Secondly, this study focuses on the direct impact of presenting credit codes on consumers' purchase intentions but lacks an in-depth exploration of potential intermediary mechanisms involved. Future research could delve deeper into and validate how credit codes influence consumers' purchase decisions by affecting intermediary variables such as trust perception, risk cognition, and emotional responses, thereby enriching and refining the theoretical framework in this field.

Thirdly, our research has confirmed that credit codes can promote the sales of place-of-origin products. This finding is encouraging for both enterprises that have adopted credit codes and the government that promotes them. Moreover, it is also beneficial for consumers as they can enjoy higher-quality products. However, we have overlooked other important aspects. For example, some small-scale enterprises may lack the necessary technological infrastructure and financial resources to implement the credit code system. Enterprises with a long-established and loyal customer base may not see the immediate need to adopt credit codes. These enterprises may believe that their existing reputation and word-of-mouth marketing are sufficient to attract and retain customers, and thus view the credit code as an unnecessary additional step. Furthermore, it remains unclear whether enterprises that are early adopters of credit codes could potentially suppress the normal sales of other enterprises producing the same place-of-origin products, thereby having an impact on the overall market. These issues necessitate a more macro-level research perspective to comprehensively understand the market dynamics and the far-reaching effects of credit code adoption.

Lastly, this study centers on agricultural products with distinctive place-of-origin characteristics. Future research could attempt to extend the influence mechanism of credit codes to product sales in other industries, exploring its applicability and differences across various product types, market structures, and consumer groups. This endeavor would serve to test and expand the theoretical boundaries of this study, providing a basis for the market practice of credit codes in broader fields in China and the formulation of corporate marketing strategies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

HW: Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. GL: Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. XL: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. YL: Supervision, Validation, Writing – review & editing. QH: Data curation, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. This research was sponsored by Natural Science Foundation of Xinjiang Uygur Autonomous Region, grant number 2022D01B121, and Research Fund on the Theory and Practice of the Party's Xinjiang Governance Strategy in the New Era by the Xinjiang Uygur Autonomous Region Federation of Social Science Circles, grant number ZJFLY56.

Acknowledgments

We thank all the participants in the experiments, the editor, and the reviewers for rigorous and helpful comments and supports for enriching the quality of this research.

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.

Correction note

A correction has been made to this article. Details can be found at: 10.3389/fsufs.2025.1705673.

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