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Willingness To Pay For Sustainably Produced Beef: A Study on Urban Consumer Preferences

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ABSTRACT

The increasing environmental and ethical challenges associated with conventional beef production have intensified consumer awareness of sustainable food systems, particularly in urban areas of Indonesia. This study examines urban consumers' willingness to pay (WTP) for sustainably produced beef, focusing on how sustainability attributes, including eco-certification, animal welfare, and environmental sustainability, affect purchasing decisions. Data were collected through a mixed-methods approach, integrating online surveys and Discrete Choice Experiments (DCE), involving a representative sample from five major urban centers: Jakarta, Surabaya, Padang, Balikpapan, and Denpasar. The findings indicate that eco-certification is the most valued attribute, with a marginal willingness to pay (MWTP) of IDR 25,000 per kilogram, followed by animal welfare (IDR 18,500) and environmental sustainability (IDR 15,000). Consumers also demonstrated a general willingness to pay a 20% premium for sustainably produced beef, although regional disparities were observed. Jakarta and Surabaya exhibited the highest WTP premiums, at 23% and 22%, respectively, reflecting the influence of socioeconomic variables, including income, educational attainment, and environmental awareness. These results underscore the growing importance of environmental concerns and ethical considerations in shaping urban consumers' preferences for beef products. The study contributes to the limited body of literature on sustainable meat consumption behavior in emerging markets, offering practical insights for policymakers, producers, and marketers in designing targeted strategies to promote sustainable beef consumption and support the development of environmentally responsible livestock industries in Indonesia.

Keywords: *Consumer preferences, Sustainably produced beef, Urban consumers, Willingness to pay,*

Introduction

The progressive increase in global beef demand over recent decades has become a salient phenomenon, particularly in developing countries such as Indonesia. This substantial growth is primarily driven by a confluence of demographic and economic factors, including rapid population growth, accelerated urbanization, and sustained improvements in per capita income. These dynamics have profoundly influenced dietary structures and food consumption patterns, thereby positioning beef as a significant component within the contemporary Indonesian urban diet (FAO, 2021). Empirical data from the Ministry of Agriculture of the Republic of Indonesia (2022) indicate that national beef consumption reached 2.67 million tons in 2021, accompanied by an average annual growth rate of 4.5% during the preceding five years. While this upward trend offers considerable economic prospects, it simultaneously imposes substantial environmental burdens. Conventional livestock production practices have been extensively documented to contribute to greenhouse gas emissions, accounting for approximately 14.5% of global agricultural emissions (Nsabiyeze et al., 2024) , as well as to deforestation, land degradation, and biodiversity decline (IPCC, 2019). These conditions accentuate the imperative for the development and adoption of more sustainable livestock production systems.

In response to these escalating environmental challenges, global discourse has

increasingly emphasized the transition toward sustainable livestock practices that integrate environmental conservation, animal welfare, and social equity. Numerous countries have established regulatory frameworks and policy instruments to mitigate the environmental footprint of their agricultural sectors (Wankar et al., 2024). Notwithstanding these advancements, the application and diffusion of sustainable livestock production systems in Indonesia remain relatively constrained. This limitation is predominantly attributed to the paucity of empirical evidence regarding consumer willingness to pay (WTP) for sustainably produced beef, compounded by limited public awareness and underdeveloped market structures that do not accommodate such products (Van Loo et al., 2014). Consequently, the identification and analysis of factors influencing consumer preferences for sustainably produced beef, particularly within the Indonesian urban context, are crucial in fostering market readiness and policy alignment.

Major Indonesian urban centers including Jakarta, Surabaya, Padang, Balikpapan, and Denpasar, play a crucial role in shaping national consumption patterns and economic trajectories. According to the Central Statistics Agency (BPS, 2022), beef consumption in these urban localities has increased by an average of 5.2% per annum, driven by lifestyle modifications and increased disposable income. However, disparities persist in consumer awareness regarding sustainability-related issues, with certain cities demonstrating higher levels of concern for environmental and health implications than others. Amalia et al. (2025) reported that consumers in Jakarta and Surabaya exhibit greater environmental consciousness compared to those in Padang and Balikpapan, where price sensitivity remains the predominant determinant in purchase decisions. This is corroborated by findings from the Ministry of Environment and Forestry (KLHK, 2021), which indicate that only 35% of consumers in major Indonesian cities actively prioritize eco-friendly product choices, despite an observable increase in environmental awareness.

Considering the intensifying discourse on the environmental implications of beef production and the emergent market potential for sustainably produced beef in Indonesia (Nsabiyeze et al., 2024), there exists a critical need to examine the determinants of consumer WTP for such products. However, empirical investigations focusing specifically on consumer behavior toward sustainably produced beef within the Indonesian context remain limited in scope and coverage. Furthermore, extant studies have yet to adequately explore the heterogeneity in consumption behavior between metropolitan centers with advanced economies and smaller urban localities with differing socioeconomic profiles. This evidentiary gap necessitates a rigorous and comprehensive inquiry into the socioeconomic, attitudinal, and regional determinants of WTP for sustainably produced beef.

The present study endeavors to address the aforementioned gaps by conducting an empirical assessment of consumer preferences and WTP for sustainably produced beef in five major Indonesian cities. By integrating behavioral economics principles with discrete choice modeling techniques, this study examines the impact of factors such as income, educational attainment, environmental awareness, and trust in eco-certification on consumer decision-making processes (Van Loo et al., 2014; Cheng et al., 2024). Beyond advancing the limited corpus of empirical research on sustainable food consumption within emerging markets, this study aims to provide robust policy recommendations and practical strategies for stakeholders in the livestock industry.

In line with these identified gaps, the present study endeavors to comprehensively examine the factors influencing urban consumers' willingness to pay for sustainably produced beef in Indonesia by integrating principles of behavioral economics and discrete choice modeling within diverse urban contexts. Particular attention is directed toward assessing how socioeconomic characteristics, including income level and educational attainment, as well as environmental awareness and trust in eco-certification schemes, affect consumer preferences and purchasing decisions. Moreover, the study seeks to investigate inter-regional variations in consumer attitudes and willingness to pay across five major Indonesian cities, each characterized by distinctive economic, social, and cultural profiles. By generating empirical evidence on these dimensions, the findings of this study are expected to inform the development of practical policy recommendations and marketing strategies that promote sustainable consumption patterns and enhance market acceptance of sustainably produced beef products in Indonesia. This study aims to make a substantive contribution to the advancement of sustainable food systems in emerging economies while supporting the long-term environmental and socioeconomic sustainability of the national livestock industry.

Materials and Methods

Research Design

This study employed a comparative cross-sectional research design to analyze consumer preferences and willingness to pay (WTP) for sustainably produced beef across five major Indonesian cities: Jakarta, Surabaya, Padang, Balikpapan, and Denpasar. These cities were purposively selected based on secondary data from the Central Statistics Agency (BPS, 2022) and the Ministry of Agriculture (2022) to represent diverse socio-economic conditions, urbanization levels, and beef consumption patterns. Jakarta and Surabaya, as metropolitan centers, exhibit the

highest per capita incomes and beef consumption rates, averaging 3.6 kg and 3.3 kg per capita per year, respectively. Padang and Balikpapan reflect medium-sized cities with moderate socio-economic profiles and lower beef consumption levels (1.8–2.1 kg per capita annually), and Denpasar represents a tourism-driven urban area with a growing consumer interest in environmentally sustainable products. The purposive selection ensured coverage of varied urban demographic and consumption characteristics, facilitating an examination of how socio-economic, environmental, and attitudinal factors influence consumer preferences for sustainably produced beef across different regional contexts.

Population and Sample

The target population of this study comprised urban beef consumers in five purposively selected Indonesian cities: Jakarta, Surabaya, Padang, Balikpapan, and Denpasar. These cities were chosen based on secondary data from the Central Statistics Agency (BPS, 2022) and the Ministry of Agriculture (2022) to reflect diverse socio-economic profiles, urbanization levels, and beef consumption patterns, ensuring heterogeneity in market conditions. Respondents were selected using a stratified random sampling technique to achieve proportional representation across key demographic strata, including age (18–55 years), income level, educational attainment, and household size.

Although the total population varied between cities, an equal allocation of 200 respondents was applied per city. This decision was methodologically justified to maintain balanced statistical power and enable reliable inter-regional comparisons of consumer preferences and willingness to pay (WTP) for sustainably produced beef. Equal sampling prevented larger cities from disproportionately influencing the overall results, a limitation often encountered in proportional sampling approaches. The total sample size of 1,000 respondents was determined to satisfy a 95% confidence level with a 5% margin of error. Data were collected through a combination of online surveys and direct interviews in modern retail outlets and traditional markets, ensuring comprehensive coverage across diverse socio-economic consumer groups.

Data Collection

Data for this study were collected using a mixed-methods approach, integrating online surveys and Discrete Choice Experiments (DCE). The online survey captured respondents' socio-demographic profiles, beef consumption habits, purchasing preferences, and attitudes toward sustainability in food production, including their willingness to pay (WTP) for sustainably produced beef. The DCE component assessed consumer preferences for specific product attributes, such as price, production methods, certification, and packaging. Respondents were presented with a series of hypothetical product choice sets and asked to select their preferred option based on varying attribute combinations. This method enabled the estimation of marginal willingness to pay (MWTP) for each attribute, providing insights into the trade-offs consumers make when choosing sustainably produced beef (Iranzad & Liu, 2024). Data were collected both online and through direct surveys in modern and traditional markets to ensure broad socio-economic coverage.

Data Analysis

The data analysis combined descriptive and inferential statistical techniques to examine consumer preferences and WTP. Descriptive statistics were used to summarize socio-demographic profiles, beef consumption patterns, and consumer attitudes toward sustainable beef. A Random Utility Model (RUM) was applied to estimate WTP, which is suitable for analyzing consumer preferences based on observed product attributes and the trade-offs consumers make between these attributes and the price (Train, 2019). The model specification included key attributes such as price, sustainability features, and certification.

1. Willingness to Pay (WTP): The utility for each individual's preference was modelled using the following equation:

$$U_{ij} = V_{ij} + \in_{ij}$$

Where:
U_{ij} is the total utility for individual *i* choosing product *j*,
V_{ij} is the deterministic component of utility, which depends on observed attributes such as price, sustainability, and certification,
ϵ_{ij} is the random error term.

2. Utility Specification**:** The deterministic component of utility for each consumer's choice was specified as:

$$V_{ij} = \beta_0 + \beta_1 \text{Price} + \beta_2 \text{Sustainability} + \beta_3 \text{Certification} + \beta_4 \text{Animal Welfar} + \beta_5 \text{Environmental Awareness}$$

Where:
Price represents the price attribute of the beef product,
Sustainability includes the environmental attributes of the product,
Certification refers to any relevant eco-certifications (e.g., organic, fair trade),
Animal Welfare addresses ethical concerns regarding livestock treatment,
Environmental Awareness represents the consumer's level of concern for environmental sustainability.

3. Choice Modeling**:** To analyze the DCE data, Mixed Logit Models (MXL) were applied. These models capture heterogeneity in consumer preferences and provide a more flexible approach for modeling consumer

choice behavior. The MXL model can be expressed as:

$$P_{ij} = \frac{\exp(V_{ij})}{\sum_{k=1}^{J} \exp\,(V_{ik})}$$

Where:
P_{ij} is the probability that individual i selects product j,
V_{ij} is the utility associated with product j for individual i,
J is the total number of alternatives in the choice set.

Additionally, the model was tested for validity through cross-validation**,** where subsets of the data were used to train and test the model, ensuring that the results were not overfitted to any data segment.

Expected Outcomes

This study aims to provide insights into the factors that influence urban consumers' WTP for sustainably produced beef, with particular emphasis on how socio-demographic factors and attitudes toward sustainability affect consumer preferences. The study is expected to reveal regional differences in WTP and identify the most significant drivers of consumer preferences for sustainable beef in Indonesia. The findings will offer valuable evidence for policymakers, producers, and marketers seeking to promote sustainable beef production and consumption. Additionally, the study will contribute to the growing body of literature on consumer behaviour regarding sustainable food products, particularly in emerging economies.

Ethical Considerations

Ethical approval for the study was obtained from the appropriate institutional review boards, and all respondents were provided with informed consent. The confidentiality and anonymity of participants were maintained throughout the research process. The study adhered to ethical guidelines for research involving human subjects, ensuring that all participants understood the purpose of the study and voluntarily agreed to participate. This methodology provides a comprehensive and statistically rigorous framework for assessing consumer preferences and WTP for sustainably produced beef in urban Indonesia. The study employs quantitative and qualitative methods and offers valuable insights into consumer behaviour, laying the groundwork for promoting sustainable food systems in Indonesia.

Results and Discussion

Characteristics of Respondents

The socioeconomic characteristics of the respondents from five major cities in Indonesia: Jakarta, Surabaya, Padang, Balikpapan, and Denpasar are outlined in Table 1. A total of 1,000 respondents participated in the study, with 200 respondents from each city. The age distribution revealed that most respondents were between 25 and 44 years old, accounting for 65.3% of the sample. This age group has been identified as the most economically active demographic in urban areas in Indonesia (Sihombing & Suryani, 2022). Gender distribution was relatively balanced, with 51.2% female and 48.8% male respondents, which aligns with national demographic trends in urban centres (Badan Pusat Statistik, 2023).

Table 1. Socioeconomic Characteristics of Respondents

Variable	Jakarta	Surabaya	Padang	Balikpapan	Denpasar
Age (years)	35.2 ± 6.1	34.8 ± 5.9	36.1 ± 6.3	35.7 ± 6.0	34.9 ± 5.8
Gender (% Female)	52.0%	50.5%	49.0%	51.5%	52.5%
Income (IDR million)	10.2 ± 2.5	9.8 ± 2.3	7.1 ± 1.8	7.5 ± 1.9	7.8 ± 2.0
Education (% ≥ Bachelor)	72.5%	72.0%	58.3%	61.7%	64.2%

Source: Primary data analysis (2025)

Regarding income, the average monthly household income was IDR 8.5 million (± 2.3 million SD), showing considerable variations across cities ($p<0.01$). Respondents from Jakarta and Surabaya reported significantly higher average incomes, IDR 10.2 million and IDR 9.8 million, respectively, compared to those from Padang, Balikpapan, and Denpasar, who reported averages of IDR 7.1 million, IDR 7.5 million, and IDR 7.8 million, respectively. This income disparity reflects the regional economic differences in Indonesia, where metropolitan cities generally offer more economic opportunities (Hornok & Raeskyesa, 2024).

Educational attainment was also a key socio-economic factor. A more significant proportion of respondents from Jakarta and Surabaya held a bachelor's degree or higher (72.5% and 72.0%, respectively) compared to Padang (58.3%), Balikpapan (61.7%), and Denpasar (64.2%). The higher education level in these two cities may be attributed to the concentration of higher educational institutions and the more robust labour markets in Jakarta and Surabaya (Paramitasari et al., 2024). In contrast, the lower percentage in cities like Padang may reflect more localized economic structures where vocational training and high school diplomas are more common (Siramaneerat et al., 2024). Regarding income, the average monthly household income was IDR 8.5 million (± 2.3 million SD), showing considerable variations across cities ($p<0.01$). Respondents from Jakarta and Surabaya reported significantly higher average incomes, IDR 10.2 million and IDR 9.8 million, respectively, compared to those from Padang, Balikpapan, and Denpasar, who reported averages of IDR 7.1 million, IDR 7.5 million, and IDR 7.8 million, respectively. This income disparity reflects the regional economic differences in Indonesia,

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Consumer Preferences for Sustainably Produced Beef

The results from the Discrete Choice Experiment (DCE) revealed significant variations in consumer preferences for sustainably produced beef across five cities in Indonesia (Table 2). The study highlighted that eco-certification was the most highly valued attribute, with respondents showing a marginal willingness to pay (MWTP) of IDR 25,000 per kilogram (± 3,200 SD). This finding underscores the growing consumer demand for transparency and certification in food production, particularly in urban areas where sustainability awareness is more prevalent (Jia et al., 2024). Eco-certification is a crucial indicator for consumers seeking assurance that their products meet environmental and ethical standards (Donato, 2025).

Following eco-certification, animal welfare was the second most valued attribute, with a MWTP of IDR 18,500 per kilogram (± 2,800 SD). The importance of animal welfare in consumer decision-making has been well-documented, reflecting broader ethical considerations among consumers regarding the treatment of livestock (Widiarta et al., 2025). This finding aligns with global trends where consumers are increasingly willing to pay a premium for products that guarantee the humane treatment of animals, indicating a shift towards more ethically conscious purchasing behaviours (Arman & Mark-Herber (2024).

Table 2. Marginal Willingness to Pay (MWTP) for Sustainably Produced Beef Attributes

Attribute	MWTP (IDR/kg)	Standard Deviation	p-value
Eco-certification	25,000	3,200	< 0.01
Animal welfare	18,500	2,800	< 0.01
Environmental sustainability	15,000	2,500	< 0.01
Price (premium)	20%	3.5%	< 0.05

Source: Primary data analysis (2025)

Another key attribute is environmental sustainability, which had an MWTP of IDR 15,000 per kilogram (± 2,500 SD), further emphasizing the importance of sustainable agricultural practices in the beef production industry. Studies have shown that consumers are increasingly aware of the environmental impact of their food choices, especially about greenhouse gas emissions and deforestation associated with livestock farming (Wibowo & Damanik, 2023). This trend reflects a broader global movement towards environmentally responsible consumption, particularly in developed urban centres.

Price remained a critical factor despite the clear preference for sustainably produced beef. Consumers indicated a willingness to pay up to 20% more for sustainably produced beef compared to conventional beef (± 3.5% SD). Price sensitivity in the context of sustainable products is a well-established challenge, as higher production costs for sustainable beef often result in price premiums that can deter budget-conscious consumers (Susanto et al., 2022). However, this premium reflects the growing recognition of the value of sustainability and ethical consumption, especially among higher-income urban populations.

Regional Differences in Willingness to Pay (WTP)

Figure 1 illustrates regional differences in the willingness to pay (WTP) for sustainably produced beef across five Indonesian cities. The data reveals substantial variation in consumer preferences, which can be attributed to several socio-economic factors, such as income, education, regional economic development, and the level of environmental awareness in each location.

Jakarta and Surabaya exhibited the highest WTP premiums, with respondents indicating a willingness to pay 23% and 22% more for sustainably produced beef compared to conventional beef. These figures suggest a strong preference for sustainability, which aligns with the economic profile of these cities. Jakarta and Surabaya are major economic hubs, with relatively higher disposable incomes and a more affluent consumer base. The higher WTP in these cities is consistent with previous studies that suggest urban populations in economically advanced regions are more likely to exhibit environmentally conscious purchasing behaviours (Wibowo & Damanik, 2023). The elevated WTP in Jakarta and Surabaya can also be linked to higher levels of education and greater access to information about environmental

and ethical issues. Consumers in these cities tend to be more aware of their consumption choices' ecological and ethical implications, further influencing their preference for sustainably

produced goods (Jia et al., 2024). Urban consumers are also more likely to be exposed to global sustainability trends and eco-certification systems, which may increase their perceived value of sustainable products (Donato, 2025). As a result, these cities exhibit a stronger inclination toward premium pricing for eco-labelled products, reflecting a broader global shift toward sustainable consumerism.

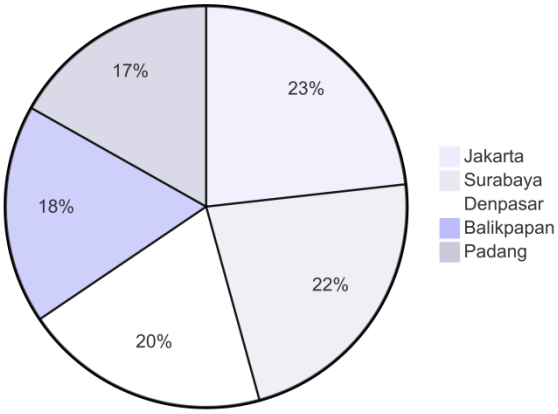

Figure 1. Regional Differences in Willingness to Pay (WTP) for Sustainably Produced Beef
Source: Primary data analysis (2025)

In contrast, Padang and Balikpapan demonstrated lower WTP premiums, with consumers in these cities willing to pay 17% and 18% more for sustainably produced beef, respectively. The relatively lower WTP in these regions can be attributed to several socio-economic factors. Both cities have lower average income levels than Jakarta and Surabaya, which naturally leads to heightened price sensitivity among consumers (Ammann et al., 2025). With less disposable income, consumers in Padang and Balikpapan may prioritize affordability over sustainability when making purchasing decisions. Furthermore, these cities have different educational profiles, with lower percentages of the population holding higher education degrees than larger urban centres (Paramitasari et al., 2024). This can influence consumer awareness and interest in sustainability, as higher education levels often correlate with more significant environmental concerns and a willingness to pay for sustainable products (Jia et al., 2024). In these cities, the emphasis on cost-effectiveness might outweigh concerns about environmental impact or animal welfare, leading to a smaller premium for sustainably produced beef.

Denpasar, located in Bali, exhibited a moderate WTP premium of 20%, placing it in the middle range among the cities studied. Bali's unique socio-economic and cultural landscape likely contributes to this middle-range WTP. Denpasar's economy is heavily influenced by tourism, with a strong emphasis on eco-tourism and sustainability. As a popular tourist destination, Bali has seen a rise in consumer demand for environmentally friendly products, driven by local and international tourists who prioritize sustainability. This trend is reflected in the local consumer base, which may be more receptive to paying a premium for sustainably produced beef due to heightened environmental consciousness (Arman & Mark-Herber (2024),). Tourism has significantly promoted sustainability and responsible consumption, likely influencing local consumer preferences (Donato, 2025). However, Denpasar's WTP premium is not as high as that of Jakarta and Surabaya, likely due to differences in income levels and broader socio-economic factors. While there is increasing awareness of sustainability, the relatively smaller size of Bali's local market and its economic structure may limit the overall willingness to pay for premium sustainable products.

The regional differences in WTP for sustainably produced beef were statistically significant ($p<0.01$), indicating that the observed variations are not due to random chance. These differences highlight the impact of local socio-economic factors such as income, education, and regional economic conditions, as well as variations in environmental awareness across cities. The significant regional disparities suggest that complex, localized factors shape consumer preferences for sustainable products and that effective marketing and policy strategies must account for these differences to promote sustainable consumption in diverse regions of Indonesia.

These findings have important implications for businesses and policymakers. Companies looking to expand the market for sustainably produced beef in Indonesia must tailor their marketing strategies to address regional preferences, adjusting for factors such as price sensitivity, educational outreach, and environmental messaging. On the other hand, policymakers could leverage these insights to design targeted educational campaigns that raise awareness about sustainable food production in areas with lower WTP, thereby fostering a more informed consumer base.

Factors Influencing Willingness to Pay (WTP)

The Random Utility Model (RUM) analysis identified several key factors influencing the willingness to pay (WTP) for sustainably produced beef. These factors, including environmental awareness, income level, education level, trust in eco-certification, and price sensitivity, highlight the complex decision-making process behind consumer preferences for sustainable food products.

Table 3. Factors Influencing Willingness to Pay (WTP) for Sustainably Produced Beef

Factor	Coefficient (β)	Standard Error	p-value
Environmental awareness	0.42	0.05	< 0.01
Income level	0.38	0.04	< 0.01
Education level	0.35	0.03	< 0.01
Trust in eco-certification	0.28	0.02	< 0.05
Price sensitivity	-0.31	0.03	< 0.01

Source: Primary data analysis (2025)

a. Environmental Awareness: Strongest Positive Correlation

Among the factors analyzed, environmental awareness exhibited the strongest positive correlation with WTP ($\beta = 0.42$, $p<0.01$), suggesting that consumers more knowledgeable about environmental issues are more likely to pay a premium for sustainably produced beef. This finding aligns with previous studies that emphasize the growing importance of environmental concerns in shaping consumer purchasing behaviour, especially in urban contexts (Bazhan et al., 2024). As environmental issues such as climate change and biodiversity loss gain prominence in public discourse, consumers increasingly prioritise sustainability in their consumption choices (da Silva Teixeira Cucato et al., 2025). These findings underscore the importance of raising consumer awareness about the ecological impact of food production, as informed consumers are more likely to support sustainable practices.

b. Income Level: Positive Correlation with WTP

Income level also exhibited a strong positive correlation with WTP ($\beta = 0.38$, $p<0.01$), indicating that higher-income individuals are more likely to pay a premium for sustainably produced beef. Higher-income consumers tend to have more disposable income, which enables them to make purchasing decisions based on ethical considerations rather than just price (Šebo et al., 2025). This result is consistent with earlier research suggesting that wealthier consumers have greater access to sustainable products and are more willing to invest in food that aligns with their values, particularly in urban areas with better access to eco-labelled goods (Sharma et al., 2023).

c. Education Level: Strong Influence on WTP

Education level was another significant factor influencing WTP, with a positive correlation ($\beta = 0.35$, $p<0.01$). This suggests that individuals with higher educational attainment are more likely to value sustainability and ethical food production practices. Education plays a critical role in shaping consumer attitudes toward environmental sustainability by increasing awareness of food choices' environmental and social implications (Yuan et al., 2024). Consumers with higher education are generally more informed about the benefits of sustainable consumption, which translates into a higher willingness to pay for sustainably produced beef (Armutcu et al., 2024).

d. Trust in Eco-Certification: Moderate Positive Correlation

Trust in eco-certification also had a significant but moderate positive correlation with WTP ($\beta = 0.28$, $p<0.05$). This indicates that consumers who trust eco-certifications' credibility are more inclined to pay a premium for sustainably produced beef. Eco-certifications such as organic or fair-trade labels are often viewed as a guarantee of environmental and ethical standards, which may increase consumer confidence in the sustainability of a product (Widodo et al., 2025). Previous studies have highlighted the importance of consumer trust in labelling systems, as perceived credibility directly influences purchasing decisions (Majer et al., 2022). Therefore, enhancing consumer trust in eco-certification schemes can be an effective strategy for increasing the market share of sustainably produced beef.

e. Price Sensitivity: Negative Correlation with WTP

Price sensitivity was found to have a significant negative correlation with WTP ($\beta = -0.31$, $p<0.01$). This suggests that higher prices for sustainably produced beef reduce consumers' willingness to pay a premium. Price sensitivity is a well-established determinant of consumer behaviour, particularly in developing countries where price is often the primary consideration in food purchasing decisions (Xu et al., 2024). Consumers with limited disposable income or those in price-sensitive market segments are less likely to prioritize sustainability when faced with higher prices (Kovacheva et al., 2024). This finding highlights the need for sustainable beef producers to balance product pricing with market conditions, particularly in lower-income regions.

Implications for Marketing and Policy: Policy Recommendations and Marketing Strategies for Sustainable Production Systems

The findings of the Random Utility Model (RUM) analysis suggest that a combination of policy initiatives and targeted marketing strategies can significantly enhance consumer willingness to pay (WTP) for sustainably produced beef, contributing to a broader shift towards more sustainable food production systems. Here, we explore key policy recommendations and marketing strategies that can support this transition.

1. Policy Recommendations
   a. Strengthening Eco-Certification Standards and Credibility

      One of the strongest drivers of WTP for sustainably produced beef was trust in eco-certification. Consumers are more likely to pay a premium for products with trusted sustainability labels. Therefore, policymakers should strengthen eco-certification standards to ensure consistency, transparency, and credibility. This could include regular audits of certification bodies, more transparent communication about certification processes, and expanding the number of recognized eco-certifications to accommodate diverse agricultural practices (Arman & Mark-Herber (2024),). Additionally, governments could subsidize certification fees for small and medium-sized producers, thus making it easier for them to enter the sustainable market. This would encourage more farmers to adopt sustainable practices and increase the availability of certified products for consumers, further stimulating market growth.

   b. Incentives for Sustainable Production Practices

      Governments can implement financial incentives and subsidies for farmers and producers adopting sustainable practices to support the transition to more sustainable production systems. These incentives include tax breaks, grants, or low-interest loans to facilitate the shift to eco-friendly farming methods such as regenerative agriculture or carbon farming (Timmer et al., 2022). Policies like these would lower producers' cost burden while incentivizing them to engage in more environmentally sustainable practices. Moreover, governments can introduce carbon taxes or pollution fees for industries that fail to meet sustainability standards. The revenue generated could be reinvested into initiatives supporting sustainable agriculture or used to subsidize the price of sustainably produced beef to reduce the price premium.

   c. Public Awareness Campaigns and Educational Programs

      Policymakers should invest in public education and awareness campaigns to increase consumer environmental awareness. These initiatives can focus on educating consumers about the environmental impacts of food production, including the benefits of sustainably produced beef. Collaborations with schools, universities, and non-governmental organizations (NGOs) could help spread awareness about the importance of sustainable food choices and the long-term benefits of supporting eco-certified products. Governments should also work with industry stakeholders to develop training programs for producers, helping them understand the economic and environmental benefits of transitioning to sustainable production methods (Šebo et al., 2025). These programs should also include training on communicating sustainability efforts effectively to consumers.

2. Marketing Strategies to Promote Sustainable Beef
   a. Targeted Marketing Based on Consumer Segments : Given that environmental awareness, income, and education were identified as key factors influencing WTP, marketers should adopt a targeted marketing approach to reach different consumer segments effectively.
      - Urban, Higher-Income Consumers: In cities like Jakarta and Surabaya, where WTP is higher, marketers can focus on premium positioning for sustainably produced beef, emphasizing the high environmental and ethical standards associated with eco-certification. These campaigns should highlight the direct link between consumers' purchasing power and their ability to positively impact the environment (Sharma et al., 2023). For these segments, exclusive eco-labels, limited-edition products, or partnerships with high-end restaurants or retailers could be effective strategies to create a sense of luxury and exclusivity around sustainable products.
      - Price-Sensitive Consumers: In cities like Padang and Balikpapan, where WTP is lower, marketers can focus on promoting the value proposition of sustainably produced beef. This could include highlighting long-term health benefits, lower environmental impact, and the overall sustainability of the beef supply chain. Offering discounts or promotions for sustainably produced beef could help these consumers overcome their price sensitivity and realize the economic benefits of sustainability in the long run (Xu et al., 2024).

   b. Building Trust and Transparency in Eco-Certification

      Marketers can build consumer trust in sustainable beef by emphasizing the credibility of eco-certification schemes in their communications. Explaining the certification process, the criteria that must be met, and the independent audits that ensure compliance

can help alleviate scepticism about eco-certifications' authenticity. Transparency in labelling is critical: labelling that communicates the product's specific environmental or social benefits will appeal to environmentally conscious consumers and increase their willingness to pay a premium (Majer et al., 2022). For instance, online platforms or mobile apps could be developed to allow consumers to track the supply chain and see the beef's environmental footprint, further strengthening consumer trust and boosting demand for sustainable beef.

c. Leveraging Social Media and Influencers

Social media campaigns using eco-conscious influencers or celebrity endorsements can significantly shift consumer attitudes toward sustainable consumption. These influencers can educate their followers on the benefits of sustainable beef consumption while showcasing the lifestyle benefits of making eco-friendly food choices (Bazhan et al., 2024). By combining storytelling with social media engagement, brands can foster a community of consumers who share their values around sustainability, which can help create brand loyalty and drive sales.

d. Creating Partnerships with Retailers and Foodservice Providers

Collaborating with retailers and food service providers to offer sustainably produced beef competitively can also increase market penetration. Special in-store promotions, such as “buy one, get one free” or discounted prices for eco-certified products, can raise awareness and encourage trial among consumers who might be hesitant to pay a premium. Partnerships with restaurants featuring sustainably produced beef on their menus can also be a powerful marketing tool. These establishments can educate their customers about the benefits of sustainable beef, positioning themselves as socially responsible businesses and enhancing their reputation among environmentally conscious consumers (Šebo et al., 2025).

Conclusion

This study aims to investigate the willingness to pay (WTP) for sustainably produced beef among urban consumers in Indonesia, focusing on the influence of factors such as eco-certification, environmental sustainability, and animal welfare. The findings indicate that eco-certification is the most valued attribute, with a marginal willingness to pay (MWTP) of IDR 25,000 per kilogram. This is followed by animal welfare (IDR 18,500) and environmental sustainability (IDR 15,000). These results highlight the significant role of sustainability attributes in consumer purchasing decisions, specifically in urban areas where environmental concerns are more pronounced. Regional differences in WTP were also observed, with higher premiums in cities like Jakarta (23%) and Surabaya (22%). This suggests that income, education, and environmental awareness significantly affect consumer preferences. The research supports the theory that higher-income consumers with better education and environmental awareness are more willing to pay a premium for sustainably produced beef. Based on these findings, it is recommended that policymakers promote eco-certification standards to enhance consumer trust in sustainable beef products. Additionally, producers and marketers can tailor their strategies to emphasize sustainability attributes that resonate most with urban consumers.

The study demonstrates that sustainably produced beef has the potential to gain market share in Indonesia, particularly in urban areas, by aligning production methods with consumer preferences for sustainability. Future research could examine the long-term effects of policy interventions on sustainable beef consumption and explore behavioral changes in response to increased sustainability awareness.

Conflict of interest

No potential conflict of interest relevant to this article was reported. All authors have agreed with the contents of the manuscript.

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Author’s contribution

The authors confirm their contribution to the paper as follows: study conception and design: DW, BRTP, CQ; data collection: DW, CQ; analysis and interpretation of results: DW, BRTP, CQ, JH, HMW; draft manuscript preparation: DW, BRTP, CQ, JH, HMW. All authors reviewed the results and approved the final version of the manuscript.

Ethics approval

This article does not involve animal subjects, so ethical approval for animal studies is not necessary in the present study.

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