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Misperceptions in egg sourcing: consumer perception and willingness to pay for cage-free eggs in Indonesia

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Abstract. Consumer concern for animal welfare issues has been steadily increasing, prompting animal-based food producers to adopt farming models aligned with animal welfare principles, such as cage-free egg production systems. This study aims to examine consumer perception regarding the origin of layer farms and their preferences toward cage-free eggs. A survey design was employed, involving 575 respondents across Indonesia, with samples obtained through a convenience sampling method. Data were analyzed using descriptive statistics and Chi-square tests. The findings reveal that most consumers possess a limited understanding of the production systems behind the eggs they consume. A total of 46.22% of consumers believed that the eggs they purchased came from cage-free systems, while in fact, they originated from battery-caged hens. Furthermore, the study shows that willingness to pay (WTP) for cage-free eggs is relatively high, at 44.70%. These results highlight the need for strategies to improve consumer perception of cage-free production systems, particularly given the significant market potential for innovative, welfare-friendly egg products.

1. Introduction

Egg consumption in Indonesia has continued to increase in line with household income growth, urbanization, and shifts in dietary patterns [1]. However, alongside this rising demand, a new awareness has emerged among consumers regarding non-nutritional aspects of animal-based food products, particularly those related to animal welfare and ethical production [2]. Consumer attention toward how animals are raised and treated throughout the production process has begun to influence their preferences and purchasing decisions.

Nevertheless, the level of public understanding regarding layer hen farming systems in Indonesia remains varied. Information on the differences between conventional systems such as battery cages and alternative systems such as cage-free has not yet been widely disseminated or fully understood by consumers [3,4]. This condition may create a gap between consumer perceptions of the origins of the eggs they consume and the actual farming practices in the field. This phenomenon is important to investigate, as it may shape consumer behavior and attitudes toward products derived from farming systems that adhere to animal welfare principles.



In recent years, growing concern for animal welfare has stimulated initiatives among some producers and farmers to shift toward cage-free layer hen farming systems [5]. As of 2024, approximately 95% of egg production in Indonesia still originates from conventional cage-based farms to maximize laying hen productivity. Cage-free systems allow hens to express more natural behaviors and are considered more aligned with animal welfare principles. However, the implementation of such systems requires higher investment and operational costs, resulting in relatively higher retail prices compared to conventional eggs.

The main challenges in developing the cage-free egg market in Indonesia lie not only on the production side but also on the demand side. Limited consumer knowledge about layer hen farming systems and their perceptions of the origins of the eggs they consume must be examined more deeply to form the basis of effective public communication and education strategies. On the other hand, evidence of consumer willingness to pay for more ethical products in several countries presents an opportunity for the development of a cage-free egg market in Indonesia that promotes more compassionate farming practices [5,6].

Based on this context, this study aims to analyze consumer perception regarding the origins of layer hen farms, as well as their preferences and willingness to pay for cage-free eggs. The findings are expected to provide empirical insights into consumer awareness levels and the potential market for products produced with consideration for animal welfare principles in Indonesia.

2. Materials and Methods

2.1 Research Design

This study employs a quantitative approach with a survey design. This approach was chosen to obtain an empirical overview of consumer perceptions and preferences regarding cage-free eggs in Indonesia. A quantitative method allows the researcher to objectively measure the relationships between variables such as demographic characteristics, consumer perception, and preferences toward layer farming systems that adopt animal welfare principles.

A survey design was selected as it is suitable for capturing consumer perceptions on a large scale within a relatively short period of time. Through a cross-sectional survey, this study observes variations in consumer perception and attitudes at a specific point in time. This approach is essential for identifying potential gaps between consumer perceptions of the origins of the eggs they consume and the actual conditions of egg production systems in practice [7].

2.2 Population and Sample

The population in this study consists of household consumers in Indonesia who consume chicken eggs. As the research focuses on general consumer perceptions, the population is not limited to a specific geographic area or economic level, but rather represents consumers from diverse social backgrounds.

The sample in this study was determined using a convenience sampling method, which is a sampling technique based on the ease of access and availability of respondents [8]. This method was selected for its efficiency and relevance to exploratory research aimed at mapping initial consumer perceptions of animal welfare issues in egg production. The study involved 575 respondents distributed across various regions in Indonesia. This number is considered sufficient to produce a representative descriptive analysis and to enable statistical testing of relationships between variables.

2.3 Data Collection

Data collection in this study was conducted using an online questionnaire distributed through various digital channels, including social media, community groups, and academic networks. The online survey approach enabled efficient data collection across different regions in Indonesia while providing flexibility for respondents to complete the questionnaire.

Table 1. Distribution of Respondents by Province

Province	Number of Respondents (n)
Special Region of Yogyakarta	153
West Java	153
Central Java	105
East Java	44
Special Capital Region of Jakarta	41
Banten	29
Others	50

The respondents were drawn from multiple provinces, with the largest proportions originating from the Special Region of Yogyakarta, West Java, Central Java, and Special Capital Region of Jakarta, while smaller numbers of respondents were reported from other provinces across Java and outside Java. The distribution of respondents across provinces reflects the nature of online survey dissemination and was not intended to be proportional.

2.4 Questionnaire

The research instrument was systematically structured to measure three main dimensions: respondent characteristics, perceptions of layer hen farming systems, and preferences and willingness to pay for cage-free eggs. The first section of the questionnaire contained questions about general demographic information, such as gender, age, and occupation. The second section included questions on consumer perception of egg production systems, their perceptions and preferences of eggs consumed. Meanwhile, the third section focused on consumer willingness to pay for eggs produced through more ethical farming systems.

Table 2. Definition of variables and type of measurement.

Variable Name	Definition	Type of Measurement
Gender	Biological sex of the respondent	Categorical (1 = Male, 0 = Female)
Age	Age of the respondents in years	Continuous
Occupation	Main occupation of the respondent at the time of the survey	Categorical (1 = Unemployed / Not working, 2 = Freelancer, 3 = Teacher, 4 = Homemaker (housewife/househusband), 5 = Employee, 6 = NGO worker, 7 = Student, 8 = Self-employed)
Preferred Chicken Image	Respondent's preferred image of chicken production system	Categorical (1 = Cage-free, 2 = Conventional)
Perceived Origin of Eggs Consumed	Respondent's perception of the production system from which the eggs they usually consume originate	Categorical (1 = Cage-free, 2 = Conventional)
Willingness to Adopt Cage-Free Eggs	Respondent's willingness to consume cage-free eggs	Categorical (1 = Already consume cage-free eggs, 2 = Yes (willing to adopt cage-free eggs), 3 = Maybe, 4 = Not willing, 5 = Do not consume eggs)

2.5 Statistical Analysis

The data obtained were analyzed using descriptive statistical techniques and simple inferential analysis. Descriptive statistics were employed to illustrate the profile of respondents, perceptions, and preferences regarding cage-free eggs. This analysis provides an overview of how consumers understand and evaluate layer hen farming practices in Indonesia. Subsequently, to examine the relationship between perception, and demographic characteristics, a Chi-square test was used. This test was selected because it is appropriate for categorical data and can identify whether a significant association exists between two non-metric variables.

Data analysis was conducted using the statistical software Stata SE to ensure accuracy and facilitate interpretation. The results of the analysis were then interpreted to understand consumer perception and preference patterns, as well as the market potential for eggs produced through more ethical farming systems that adhere to animal welfare principles.

3. Results and Discussion

3.1 Characteristics of Respondents

The characteristics of the respondents in this study include distributions based on gender, age, and occupation. A total of 515 respondents participated in the survey, with females comprising 58.82% and males 41.18%. The average age of respondents was 30.48 years (SD = 8.60), with an age range between 16 and 60 years. Male respondents had a slightly higher mean age (31.90 years) compared to female respondents (29.60 years).

Table 3. Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)	Average Age (years)	SD (years)	Min	Max
Gender	Female	340	59.13	30.00	8.17	17	59
	Male	229	39.83	31.94	9.39	16	60
	Not Specified	6	1.04	28.33	12.24	17	50
Age (Total)		100	30.76	8.76	16	60	60
Occupation	Unemployed/Not Working	3	0.52				
	Freelancer	28	4.87				
	Teacher	9	1.57				
	Homemaker (Housewife/Husband)	61	10.61				
	Employee	256	44.52				
	NGO Worker	4	0.7				
	Student	133	23.13				

The characteristics of the respondents indicate that the majority belong to the productive age group with diverse social backgrounds. Females account for 59.13% of respondents, males 39.83%, and 1.04% did not disclose their gender. The average age is 30.76 years (SD = 8.76), ranging from 16 to 60 years, reflecting the involvement of both younger and economically active adults in food consumption issues. In terms of occupation, employees constitute the largest group (44.52%), followed by students (23.13%) and self-employed individuals (14.09%), while homemakers represent 10.61% of the sample.

This demographic structure suggests that most respondents have access to information, participate in household consumption decisions, and possess relatively stable purchasing power.

The higher proportion of female respondents is particularly relevant, as women often play a key role in household food decision-making [9,10]. These compositions imply that education on cage-free eggs and animal welfare has strong potential when targeted toward the productive-age and working population, while outreach efforts should also be expanded to strategic groups such as educators and social workers.

3.2 Consumer Perception of the Origin of Eggs Consumed

Consumer perceptions of poultry farming systems play an essential role in shaping attitudes and preferences toward livestock products, including chicken eggs. The cage-free farming system, in which hens are raised without battery cages, is often associated with better animal welfare, higher product quality, and stronger ethical and sustainability values. Previous studies have demonstrated that consumer understanding of food production systems significantly influences purchasing behavior and willingness to pay for sustainable products [11]. In the Indonesian context, consumer perception of the cage-free system remains relatively limited; however, the global trend toward sustainable products has the potential to influence market preferences [12].

Table 4. Consumer Preferences and Perceptions of Egg Production Systems

Variabel	Category	Frequency (n)	Percentage (%)
Preferred Chicken Image	Cage-free	556	96.7
	Conventional	19	3.3
	Total	575	100
Perceived Origin of Eggs Consumed	Cage-free	291	51.23
	Conventional	277	48.77
	Total	568	100

The results of the study show that the majority of respondents (96.70%) preferred the image of hens raised in a cage-free system compared to those raised in conventional systems (3.30%). This finding indicates that, visually, consumers tend to have a positive preference for depictions of a more spacious and unrestricted poultry farming environment.

Table 5. Perceptions of Egg Production System and Types of Eggs Consumed

Type of Eggs Consumed	Perceived Source of Eggs Consumed (%)			Total (n)
	Cage-Free	Conventional-Cage	Do Not Consume Eggs	
Cage-Free Eggs	83 (66.40)	42 (33.60)	0 (0)	125 (100)
Non-Cage-Free Eggs	208 (46.22)	235 (52.22)	7 (1.56)	450 (100)
Total	291 (50.61)	277 (48.17)	7 (1.22)	575 (100)

The analysis reveals a considerable information gap among respondents. Of the 125 respondents who reported consuming cage-free eggs, 66.40% (83 individuals) believed that the eggs they consumed did indeed come from cage-free farms, while 33.60% (42 individuals) perceived that their eggs originated from conventional cage systems. None of the respondents in this group reported not consuming eggs at all. This indicates that most cage-free consumers have perceptions that align with the type of eggs they consume, although approximately one-third still hold inaccurate or incorrect perceptions [3].

Conversely, among non-cage-free egg consumers (450 respondents), the majority—52.22% (235 individuals)—believed that the eggs they consumed came from conventional cages, which

corresponds with the dominance of battery cage systems in Indonesia. Interestingly, 46.22% (208 individuals) believed that the eggs they consumed were cage-free, despite actually purchasing conventional eggs. This highlights a substantial level of misconception or lack of understanding among consumers regarding egg production systems. Additionally, 1.56% (7 individuals) in this group reported not consuming eggs.

Overall, among all 575 respondents, the distribution of perceptions was as follows: 50.61% believed their eggs came from cage-free systems, 48.17% believed they came from conventional cages, and 1.22% did not consume eggs at all. In reality, however, only 125 respondents were actual consumers of cage-free eggs. This indicates the presence of a knowledge gap between consumer perceptions and actual consumption behavior.

3.3 Willingness to Pay Cage-Free Eggs

A cross-tabulation analysis was conducted to examine the relationship between respondents' attitudes toward egg consumption after receiving information and their willingness to pay more for cage-free eggs [13]. The first variable indicates whether respondents were willing to increase their egg consumption, were uncertain, or remained unwilling to consume more. The second variable reflects their willingness to pay a higher price for eggs produced through more ethical practices. The combination of these two variables provides insight into the extent to which changes in consumption attitudes align with a willingness to provide financial support for more sustainable farming practices.

Table 6. Consumer Willingness to Adopt and Pay for Cage-Free Eggs

Willingness to Adopt Cage-Free Eggs	Willingness to Pay More for Cage-Free Eggs (%)					Total
	Maybe	Already Consume	No	Yes	No Answer	
Already consume cage-free eggs	3 (6.52)	31 (67.39)	2 (4.35)	10 (21.74)	0 (0.00)	46 (100.00)
Yes (willing to adopt cage-free eggs)	57 (21.59)	5 (1.89)	7 (2.65)	195 (73.86)	0 (0.00)	264 (100.00)
Maybe	158 (68.40)	2 (0.87)	10 (4.33)	25 (10.82)	46 (19.91)	231 (100.00)
Not willing	5 (18.52)	0 (0.00)	16 (59.26)	6 (22.22)	0 (0.00)	27 (100.00)
Do not consume eggs	0 (0.00)	0 (0.00)	0 (0.00)	7 (100.00)	0 (0.00)	7 (100.00)
Total	223 (38.78)	38 (6.61)	50 (8.70)	257 (44.70)	7 (1.22)	575 (100.00)

Pearson chi2(16) = 1.100 Pr = 0.000

The group of respondents who explicitly stated their willingness to switch to cage-free eggs ("Yes" category) amounted to 264 individuals, the majority of whom (195 respondents or 73.86%) were also willing to pay more. This finding indicates that when the commitment to cage-free eggs is clear, most respondents support it not only attitudinally but also financially. Among those who were already consuming cage-free eggs (46 respondents), 67.39% expressed willingness to pay a premium, while only a small proportion (4.35%) refused to do so. This suggests that direct experience with consuming cage-free eggs is correlated with a higher readiness to pay a premium price.

In the group of respondents who were uncertain or “Maybe” willing to switch (231 respondents), the majority (68.40%) were also unsure about paying more. Only 10.82% of this group were willing to pay a higher price. This indicates that this segment holds potential for change but remains hindered by uncertainty or economic considerations. Meanwhile, among respondents who explicitly refused to switch (27 individuals), most were also unwilling to pay more (59.26%), although approximately 22.22% were still willing to pay a premium despite not intending to change their consumption. This suggests the presence of a small group of respondents who morally support the cage-free system but are not yet ready to adjust their consumption behavior.

Interestingly, respondents who did not consume eggs at all (seven individuals) were entirely willing to pay more for cage-free eggs (100%). Although this group is small, this finding illustrates that ethical values or concern for animal welfare may arise even without direct consumption behavior.

Overall, the results indicate that willingness to switch (WTS) to cage-free eggs aligns with willingness to pay (WTP). Consumers who hold positive preferences toward more ethical production systems are largely accompanied by economic readiness to support such change [14]. The uncertain group remains the second-largest segment, highlighting the potential for behavioral shifts if adequate information, education, and more affordable access are provided. These findings affirm that the transition toward cage-free egg consumption in Indonesia is not solely a matter of price but is also shaped by understanding, experience, and ethical values held by consumers [15].

4. Conclusion

This study demonstrates that a portion of egg consumers in Indonesia still hold misperceptions regarding the origins of the eggs they consume, including the production systems and the types of eggs available on the market. Misconceptions about the source and type of eggs remain relatively high, influencing consumer perspectives and purchasing decisions. The findings also confirm that the willingness to pay (WTP) for more ethically produced eggs, such as cage-free eggs, is relatively high in Indonesia. However, price affordability remains a primary consideration for consumers, indicating that the adoption of sustainable products requires strategies that address not only perception but also economic accessibility. These results further provide evidence that the transition toward cage-free egg consumption in Indonesia is not merely a matter of price, but is also shaped by consumer understanding, experience, and ethical values.

Overall, this study underscores the importance of collaboration between the government, industry actors, and civil society organizations in enhancing consumer literacy regarding animal welfare and more sustainable food production systems. Without systematic and continuous education, consumer preferences for cage-free eggs are unlikely to develop significantly at the market level. Therefore, strengthening regulations, improving supply chain transparency (including product labelling), and implementing effective public communication strategies are crucial to fostering behavioral change toward a more ethical and sustainable food system in Indonesia.

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