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Consumer Preference for Poultry Eggs and Layer Meat in Bengaluru Rural District of Karnataka - A Conjoint Analysis

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Abstract

The present study attempts to analyse the consumer preference for poultry eggs in Bengaluru rural district of Karnataka. A total of 120 consumers were randomly selected for the study. The consumer preference for eggs was analysed using conjoint analysis, in which respondents rank preferences for different offers that is decomposed to determine the person's inferred utility function for each attribute and the relative importance of each attribute. The attributes considered for the study were the price of egg, colour of eggshell (brown/white), size of the egg, form (packed/unpacked) in which the egg was purchased along with frequency of purchase. The results revealed that the price of egg was the most important factor considered by consumers as they seek to make economical choices that fit their budget constraints. The second important factor which influenced the preference was colour of the eggshell because consumers believe that the colour of the eggshell is an important indicator of nutritional differences. The third important factor pertains to the size of egg. Consumers believe that the differences in size does not significantly impact their cooking or consumption experience, as long as the size falls within a reasonable range. The fourth important attribute was packaging, since eggs are mostly sold in the unpacked form, consumers are not highly concerned about this attribute. The least important attribute was the frequency of purchase and this attribute did not possess significant consideration because consumers are accustomed to buying them at inconsistent intervals; Interestingly, consumers displayed more positive attitude towards layer chicken eggs than native chicken eggs. The results of the study offer valuable insights to traders and consumers in the layer poultry industry, allowing traders to realign their strategies for improved market positioning in accordance with consumer's attribute-based preferences.

Keywords : Layer poultry eggs, Consumer preference, Conjoint analysis, Price of eggs

Poultry is one of the fastest-growing sectors in India with an estimated CAGR of 15.20 per cent for the period 2021 to 2026. It plays a very important role in the economic development of the country. Poultry industry is the fastest growing sector in Indian agriculture. Currently, India is the fourth largest egg producer in the world, China being the major producer of eggs followed by EU and USA. The layer segment in the country is all set to grow at Rs.10,000 crores. According to the Ministry of Agriculture, India's egg production is estimated at 47.3 billion eggs per annum. With more and more 'eggetarians' on the rise, egg consumption is growing at 8-10 per cent annually. Egg being an excellent source of protein is fast becoming a favorite among urban Indians.

The egg production in the country has increased from around 104 billion eggs in 2018-19 to 114 billion

in 2020-21. Per Capita availability was increased from 79 eggs in 2019 to 86 in 2020. The poultry sector in India has undergone a paradigm shift in its structure and operation. This transformation has involved sizable investments in breeding, hatching, rearing and processing. The industry is growing largely due to the initiative of private enterprises, government intervention and considerable indigenous poultry genetic capabilities and adequate support from the complementary veterinary health, poultry feed, poultry equipment and poultry processing sectors.

Layer poultry farming is practiced extensively on commercial scale by the farmers. The layer poultry farming in the study area has flourished very well with immense potentialities for production, marketing and development. There is a huge demand for eggs, value added products like ready to cook meat, egg powder, with availability of quicker transportation facilities to the place of demand and scope of layer poultry enterprise in the near future due to distinct favorable conditions *i.e.,* climatic endowments, feed manufacturing units and various hatcheries that are operating in the study area.

METHODOLOGY

Study Area

The study was conducted in rural transects of Bengaluru North and South. For the study, Bengaluru rural was purposively selected. The distinction between urban and rural transects of Bengaluru was made based on the survey stratification index developed by considering the percentage of built-up area and its linear distance from the city centre. The range of values for this parameter depends on the location and shape of the transects. In the Northern transect, the most proximal village was 9.2 km and the most distal village 47.2 km from the urban centre (defined at Vidanha Soudha); in the Southern transect they were at 8.8 and 40.1 km, respectively. When distances are normalised, *i.e.,* the shortest distance to city centre is set to zero and the largest distance to 100 per cent, the results still depend on the shape of the transect and North and South transects are not directly comparable. In both transects, the frequency of distance values was homogeneously distributed (Ellen *et al.*, 2017). Vidhana Soudha, the building of the State legislature, was used as the reference point to measure the distance (Pooja and Umesh, 2021). Up to about 20 to 25 km away from the city centre, building density was strongly correlated to distance (the closer to the city, the higher the percentage of built-up area). Beyond that, however, the two parameters were negatively correlated (Udaykumar and Umesh, 2020). Accordingly, the urban and rural transects were formed.

Sampling Framework

The study was based on primary data collected from sample respondents using a pre-tested structured schedule through personal survey method. For the study, 90 consumers from rural transects of Bengaluru North and South, were drawn randomly. The data was collected during the year 2022-23.

Analytical Tool Used

Conjoint Analysis

Conjoint Analysis is a versatile marketing research technique that can provide valuable information for new product development and forecasting, market segmentation and pricing decisions, advertising and distribution, competitive analysis and repositioning. It is a technique used in assessing consumer's value judgments. Hence, for the present study, this tool was used to analyse the consumer's preference for layer poultry eggs and meat.

The attributes included in a conjoint analysis experiment correspond to important consumption characteristics or characteristics hypothesized to influence purchase behaviour. The attributes werefurther divided into levels. The conjoint experiment employs a full-profile approach, in which the level of each attribute of the consumption to be rated is specified.

Conjoint analysis helps to identify the factors that matter most to different categories of consumers that are included in the study by estimating the relative importance that each attaches to a given factor in

making a purchase decision. Since, the demand functions for various attributes of consumers differ, with households being driven by utility and restaurants by profit, it is expected that the relative importance that each class attached to the attributes will differ. However, despite these differences, conjoint analysis can also provide overall relative importance that all the different categories of consumers attach to a given factor in making a purchasing decision (Kwadzo *et al*., 2013).

The following seven steps were taken for conducting conjoint analysis.

a) Establishing the attributes.

b) Assigning levels for each attribute.

c) Selecting the conjoint methodology.

d) Deciding which profile to present to the respondents.

e) Establishing preferences for each attribute.

f) Choosing the presentation method.

g) Selecting a method for part-worth estimation.

Based on the goodness of fit, the additive conjoint model was used in this study. The model has been formulated as:

$$Y = \sum_{i=1}^{n} \sum_{j=1}^{m} V_{ij} X_{ij}$$

where,

Y = Consumer's overall evaluation of layer poultry eggs and meat.

V_{ij} = Part-worth contribution or utility associated with the j^{th} level (j, j=1, 2, ….., m) of the i^{th} attribute (i, i=1, 2, …, n)

X_{ij} = Dummy variable representing the preference for the j^{th} level of the i^{th} attribute

(one, if the j^{th} level of the i^{th} attribute is present, otherwise zero)

n = Number of attributes

m = Number of levels of attribute 'i'

For the present study, a profile describing alternatives was constructed by combining the levels of five attributes. The attributes and their levels (Tables 1 and 2) were identified through discussions with consumers during preliminary survey and also in consultation with subject matter specialists and accordingly, 22 cards were generated with different combinations and the same were used for collection of information pertaining to consumer preferences in the study area. The consumers were requested to rank each card based on their preferences.

Results and Discussion

The important attributes considered for analysing the consumer preference for eggs in rural transect of Bengaluru were price, shell colour, size, packaging, and frequency of purchase. The significance of price, with options ranging from less than Rs.5/- to more than Rs.5/- underscores the role of affordability in decision-making. Furthermore, the selection of white or brown-shelled eggs, along with choices of size and packaging, offers consumers a variety of options to

Table 1

Attributes and their relative levels for Bengaluru rural for eggs

Attributes	Levels
Price	Less than Rs. 5/- More than Rs. 5/-
Colour	White shelled Brown shelled
Size	Small Medium Large
Packaging	Packed Unpacked
Frequency of purchase	Weekly Fortnightly Monthly

TABLE 2
Attributes and their relative levels for Bengaluru rural for layer meat

Attributes	Levels
Type	Layer
	Broiler
	Country chicken
Price	Up to Rs. 150 per kg
	Rs. 151 per kg – Rs. 200 per kg
	More than Rs. 200 per kg
Purchase	Shop
	Directly from farm
Frequency	Weekly
	Fortnightly
	Monthly
Form	Whole bird (dressed)
	Specific parts

align with their preferences. The frequency of purchase, whether weekly, fortnightly or monthly, reflects the nuanced nature of consumer demand. For each respondent, the part-worth utilities were estimated using OLS regression analysis.

The attributes and their relative levels for layer meat in Bengaluru rural paint a comprehensive picture of consumer preferences in this market. Type, price, purchase location, frequency and form of layer meat were considered as they are essential factors in shaping consumer choices. The choice between layer, broiler or country chicken meat reflects varying tastes and dietary preferences. Price segments, from lower to higher ranges, account for affordability as a key driver of selection. Deciding between purchasing from a shop or directly from a farm impacts convenience and sourcing preferences. Additionally, the frequency of purchase, whether on a weekly, fortnightly or monthly basis, reveals the variability in demand for layer meat. The option to choose between whole dressed birds and specific meat parts adds another layer of customization. For each respondent, the part-worth utilities were estimated using OLS regression analysis.

The socio-economic characteristics of sample consumers in north and south transect of Bengaluru rural are presented in Table 3. Age distribution revealed that 29.16 per cent of respondents fall within the 20 to 30-year age range, 50.83 per cent were between 31 to 50 years old and 20 per cent were above 50 years old, reflecting a varied age structure that influence dietary choices and nutritional needs. The prevalence of the 31 to 50 age group (50.83%) was due to the presence of job opportunities in the nearby urban areas, such as Bengaluru city, which may attract individuals in their prime working years. The proportion of individuals above 50 (20%) were found to be influenced by the presence of retired individuals or those engaged in agricultural activities, which can often be physically demanding and continue into later years.

Gender diversity shows that 43.34 per cent were male, while 56.67 per cent were female, underlining the importance of gender-sensitive dietary analyses. The relatively higher percentage of females (56.67%) found to be attributed to factors such as a higher female population in the region, including homemakers and a potential trend of females participating in surveys and research activities more readily than males. In terms of literacy levels, 15.83 per cent of respondents were illiterate, 37.5 per cent have completed primary school and 16.67 per cent have a high school education, showcasing diverse educational backgrounds. The prevalence of primary school education (37.5%) and illiteracy (15.83%) are linked to limited access to quality education in rural areas, where schools and educational resources were scarce compared to the Bengaluru urban. High school education (16.67%) might indicate a segment of the population that has relatively better access to educational institutions.

Occupation data indicated that 37.5 per cent were engaged in farming, 32.5 per cent were homemakers, and 21.67 per cent were self-employed, underscoring the significance of considering livelihoods when

TABLE 3

Socio-economic characteristics of sample consumers in Bengaluru rural

(n=120)

Particulars	Number	Per cent
Age (years)		
20 to 30	35	29.16
31 to 50	61	50.83
Above 50	24	20
Total	120	100
Gender		
Male	52	43.34
Female	68	56.67
Total	120	100
Literacy Level		
Illiterate	19	15.83
Primary School	45	37.5
High school	20	16.67
PUC	12	10
Degree and above	14	11.67
Total	120	100
Occupation		
Private employee	8	6.67
Government employee	2	1.67
Self-employed	26	21.67
Farming	45	37.5
Homemaker	39	32.5
Total	120	100
Income Level		
Up to Rs. 20,000 per month	48	40
Rs. 20,001 to Rs. 50,000 per month	57	47.5
More than Rs. 50,000 per month	15	12.5
Total	120	100
Frequency of egg consumption		
Weekly	78	65
Fortnightly	27	22.5
Monthly	15	12.5
Total	120	100
Frequency of layer meat consumption		
Weekly	12	10
Fortnightly	35	29.67
Monthly	73	60.83
Total	120	100

evaluating dietary habits. The significant percentage of population engaged in farming (37.5%) was due to Bengaluru rural's agrarian nature, with a substantial portion of the population involved in agricultural activities. The proportion of homemakers (32.5%) reflect traditional gender roles and household structures prevalent in the study area. Income distribution was stratified, with 40 per cent earning up to Rs.20,000 per month, 47.5 per cent earning between Rs.20,001 and Rs.50,000 per month and 12.5 per cent earning more than Rs.50,000 per month, highlighting variations in economic capacity. The dominance of individuals earning between Rs.20,001 and Rs.50,000 per month (47.5%) is linked to a mix of agricultural income, small-scale businesses and employment opportunities in nearby urban centers. A lower percentage of individuals earning more than Rs.50,000 per month (12.5%) could indicate limited high-income employment opportunities in the predominantly rural setting. Finally, findings show that 65 per cent of respondents consume eggs weekly, while 60.83 per cent consume layer meat monthly, shedding light on their consumption patterns. High weekly consumption of eggs (65%) is due to their affordability and nutritional value, making them a staple in many diets. Frequent monthly consumption of layer meat (60.83%) could be related to cultural or

TABLE 4

Correlation among attributes of consumer preference for egg consumption in Bengaluru Rural

Correlation	Value for Egg consumption
Pearson's R	0.912 *
Kendall's tau	0.880 *

*significant at five per cent level

dietary preferences, availability and affordability of non-vegetarian options in the region.

The additive model was found to be a relatively better fit. Table 5 illustrates the correlation among attributes influencing consumer preferences for egg consumption in Bengaluru Rural. The provided correlation values, both Pearson's R (0.912) and Kendall's tau (0.880), indicate a strong and statistically significant relationship between these attributes and egg consumption patterns. The asterisk (*) denotes that these correlations are significant at the five per cent level. These significant correlations are of paramount importance for businesses, traders and marketers operating in the Bengaluru Rural egg market. They signify that understanding and strategically addressing these attributes, such as price, shell color, size, packaging and frequency of purchase, can have a substantial impact on consumer choices.

TABLE 5

Correlation among attributes of consumer preference for layer meat consumption in Bengaluru Rural

Correlation	Value for Layer meat consumption
Pearson's R	0.546 *
Kendall's tau	0.632 *

*significant at five per cent level

Table 6 presents the correlation among attributes influencing consumer preferences for layer meat consumption in Bengaluru Rural. The provided correlation values, both Pearson's R (0.546) and Kendall's tau (0.632), indicate a moderate to strong and statistically significant relationship between these attributes and layer meat consumption patterns. The asterisk (*) signifies that these correlations are significant at the five percent level. These significant correlations hold substantial implications for stake holders in the Bengaluru Rural layer meat market. They highlight the importance of understanding and strategically addressing the attributes, such as type, price, purchase location, frequency and form in shaping consumer choices and influencing market dynamics.

TABLE 6

Conjoint analysis of preference for eggs by Bengaluru rural consumers

Attributes	Levels	Utility estimate	Relative importance
Price	Less than Rs. 5/-	2.913	30.893
	More than Rs. 5/-	-2.913	
Size	Small	-0.806	23.738
	Medium	0.849	
	Large	-0.043	
Colour	White shelled	0.553	18.081
	Brown shelled	-0.553	
Frequency of purchase	Weekly	0.438	17.430
	Fortnightly	0.035	
	Monthly	-0.473	
Packaging	Packed	-0.254	9.858
	Unpacked	0.254	

The relative importance of the part-worth functions was compared across different attributes within segments to arrive at the relative importance of each attribute. The average part-worth and the relative importance of the attributes for rural transects of Bengaluru North and South are presented in Tables 7.

The results revealed that price is the most influential attribute, with a substantial utility estimate of 2.913 for eggs priced less than Rs.5/-, indicating a strong positive preference for affordability. Conversely, there is a pronounced aversion, with a corresponding utility estimate of -2.913, for eggs priced above Rs.5/-. This underscores the pivotal role of affordability in the decision-making process, likely reflecting the economic diversity of the rural population. Similar results have shown in the study conducted by Mesias *et al.,* (2010) investigated the preferences of Spanish consumers for alternative types of eggs that enter the market. The survey was conducted with 361 consumers using conjoint analysis. The study analysed that the relative importance of the main attributes

TABLE 7

Conjoint analysis of preference for layer meat by consumers of Bengaluru Rural

Attributes	Levels	Utility level	Relative importance
Type	Layer	-3.821	47.749
	Broiler	2.791	
	Country chicken	1.030	
Price	Up to Rs. 150 per kg	1.803	34.345
	Rs. 151– Rs. 200 per kg	4.706	
	More than Rs. 200 per kg	-6.509	
Frequency	Weekly	0.563	9.453
	Fortnightly	0.004	
	Monthly	-0.567	
Purchase	Shop	0.673	6.449
	Directly from farm	-0.673	
Form	Whole bird (dressed)	0.883	2.04
	Specific parts	-0.883	
	Total		100

that affect consumer preferences for eggs and to distinguish segments of consumers with similar preference profiles. It was found that price was the most important attribute determining consumer preferences, followed by the hen's feed and their rearing conditions. It was also found that only some groups of consumers were willing to pay the premium necessary for alternative methods of production. Size was the second most significant factor, with a preference for medium-sized eggs (utility estimate of 0.849) and a mild aversion to small-sized (utility estimate of -0.806) and large-sized (utility estimate of -0.043) eggs. This size preference align with typical household consumption patterns and culinary practices in the region. Additionally, Colour of the egg was referred to as the third important attribute, Analysis highlights a slight preference for white-shelled eggs, with a utility estimate of 0.553, suggesting that shell colour does play a role in consumer choices. Fourth important attribute being the frequency of purchase, analysis revealed a preference for weekly purchase (utility estimate of 0.438), a mild preference for fortnightly purchase (utility estimate of 0.035) and an aversion to monthly purchase (utility estimate of -0.473). This suggests that accessibility and availability of eggs play a significant role in shaping consumer choices, likely reflecting local market dynamics. Lastly, the packaging attribute showed a slight preference for unpacked eggs (utility estimate of 0.254), indicating that consumers may associate freshness or local sourcing with this attribute.

The results of the conjoint analysis examining consumer preferences for layer meat in Bengaluru rural offer a nuanced understanding of the multifaceted factors that drive purchasing decisions in this unique market. The analysis underscores the pre-eminent role of meat type, with a substantial negative utility level of -3.821 for layer meat, reflecting a strong aversion to this option. In contrast, broiler meat received a positive utility level of 2.791, indicating a strong preference, while country chicken meat falls in between with a utility level of 1.030, reflecting a moderate preference. This emphasizes the dominance of meat type as the most influential attribute, possibly reflecting specific taste preferences and culinary practices in the region. Price emerges as the second most critical attribute, with a significant positive utility level of 1.803 for meat priced up to Rs.150 per kg, reflecting a preference for affordability (Table 4). Meat priced between Rs.151 and Rs.200 per kg receives a substantial positive utility level of 4.706, signifying a strong preference for this price range. Conversely, meat priced more than Rs.200 per kg faces strong aversion, with a utility level of -6.509. This underscores the importance of price sensitivity among consumers in this market. The frequency of purchase also influences preferences, with a positive utility level of 0.563 for weekly purchases and a slight preference for fortnightly purchases (utility level of 0.004). Conversely, there is an aversion to monthly meat purchases, with a negative utility level of -0.567. This highlights the importance of accessibility and availability in shaping consumption patterns. Purchase location played a less influential role, with a positive

utility level of 0.673 for purchasing from a shop, reflecting a preference for this mode. Purchasing directly from a farm carried an equivalent negative utility level of -0.673, suggesting an aversion to this mode. Regarding the form of meat, whether whole dressed birds or specific parts, it played a relatively minor role. Opting for whole-dressed birds has a positive utility level of 0.883, signifying a preference for this form. In contrast, choosing specific parts of the bird carried an equivalent negative utility level of -0.883, suggesting an aversion to this form. However, the form of meat has the lowest relative importance among all attributes, indicating its limited influence on overall preferences.

The growth of the broiler meat segment is expected to remain strong due to factors such as consumer preference for poultry, increasing income levels and changing food habits. Poultry meat, in general, has gained broad consumer acceptance, primarily because of its relatively lower price compared to other meat types (Kumar and Bhat 2012). In this context, the lower relative price of broiler meat may also have a correlation with the growth of the layer meat segment. While broiler meat is known for its cost advantage, layer meat may emerge as an appealing option for consumers who prioritize different factors. Layer meat, often derived from hens that are specifically raised for egg production, might be favoured by those who seek specific taste and texture attributes in their meat. Thus, the growth of the layer meat segment could be influenced by consumer preferences and specific market demands, even as broiler meat remains competitively priced.

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