
From Laboratory To Household Table: Awareness and Acceptability of Cultured Meat As A Sustainable Protein Alternative for Domestic Consumption

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Abstract

Cultured meat has emerged as a promising alternative protein innovation with potential implications for food security, environmental sustainability, animal welfare, and responsible consumption. However, its successful introduction into household food systems depends largely on consumer awareness, perceived safety, trust, affordability, sensory expectations, and cultural acceptability. This study assessed the level of awareness and acceptability of cultured meat for household consumption among 320 households in Pangasinan, Philippines. Using a descriptive-correlational research design, data were gathered through a structured survey questionnaire and analyzed using frequency counts, percentages, weighted means, standard deviations, correlation analyses, and group comparison tests. Findings revealed that respondents had a moderate level of awareness of cultured meat, with limited knowledge of how it is produced. Perceptions were also moderate, with favorable views on environmental and ethical benefits, but low perception of naturalness. Acceptability was moderate overall, with willingness to try rated higher than willingness to purchase, pay for, serve, or substitute cultured meat for conventional meat. Awareness was significantly and positively related to acceptability, indicating that better-informed consumers were more open to cultured meat. Significant differences in acceptability were observed across age, education, income, meat consumption patterns, and exposure to alternative proteins. The study concludes that cultured meat has potential for household acceptance, but consumer education, safety assurance, transparent regulation, affordability, and sensory familiarization are necessary to improve market readiness.

Keywords: *cultured meat; cellular agriculture; consumer awareness; household acceptability; alternative protein; sustainable food systems; food innovation*

Introduction

Cultured meat, also known as cultivated, cellular, cell-based, or lab-grown meat, is an emerging food innovation produced by cultivating animal cells under controlled conditions rather than raising and slaughtering animals. It has been increasingly discussed as a potential sustainable protein alternative due to its relevance to food security, environmental sustainability, animal welfare, responsible consumption, and future protein demand. As global food systems face pressures from population growth, climate change, land-use limitations, and concerns about conventional livestock production, cultured meat has become part of broader discussions on alternative proteins and sustainable food transitions.

Despite its technological promise, cultured meat cannot become a viable food option without consumer acceptance. Food choices are shaped not only by scientific innovation but also by awareness, trust, affordability, perceived safety, sensory expectations, cultural familiarity, and household decision-making. In domestic settings, food decisions are often influenced by family preferences, budget, taste, health concerns, children's acceptance, and confidence in regulatory approval. Thus, household acceptability is a critical factor in determining whether cultured meat can move from laboratory development to actual consumer use.

Previous studies indicate that consumer acceptance of cultured meat is influenced by awareness, perceived naturalness, food safety concerns, health perceptions, environmental beliefs, animal-welfare concerns, willingness to pay, trust in science, and food neophobia. Consumers may be willing to try cultured meat out of curiosity but may be less willing to purchase it regularly, serve it to family members, or substitute it for conventional meat. This distinction is important because market readiness depends not only on trial intention but also on sustained household adoption.

In the Philippine context, empirical studies on awareness and acceptability of cultured meat remain limited. Household consumers may have varying levels of exposure to alternative protein products, and their acceptance may be influenced by affordability, food culture, meat consumption habits, trust in food regulation, and understanding of biotechnology. Therefore, localized studies are necessary to determine how Filipino household consumers perceive cultured meat as a possible future food product.

This study determined the awareness and acceptability of cultured meat for household consumption among selected household consumers in Pangasinan, Philippines. Specifically, it examined respondents' demographic and household food consumption profiles, levels of awareness, perceptions of cultured meat, levels of acceptability, the relationship between awareness and acceptability, differences in acceptability across respondent groups, and the barriers and enabling factors influencing household acceptance. The findings may provide baseline evidence for consumer education, food innovation policy, regulatory preparation, and sustainable protein market-readiness planning.

Methodology

Research Design

This study employed a descriptive-correlational research design using a quantitative survey approach with a limited qualitative component through open-ended questions. The descriptive component was used to determine the profile of the respondents, their level of awareness, perceptions, and acceptability of cultured meat for household consumption. The correlational component was used to determine whether a significant relationship existed between awareness and acceptability.

The study also examined whether significant differences in the acceptability of cultured meat existed when respondents were grouped by selected demographic and household food-consumption variables.

Research Locale

The study was conducted among selected household consumers in Pangasinan, Philippines. The province was considered appropriate because it includes urban, semi-urban, and rural households with diverse socio-economic backgrounds, food purchasing behaviors, and meat-consumption patterns. Since cultured meat is not yet widely available in local markets, the study measured perceived or hypothetical acceptability based on a neutral information brief about cultured meat.

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Participants of the Study

The participants were 320 household consumers aged 18 years or older. They were selected because they were directly or indirectly involved in household food decisions, such as food purchasing, meal preparation, menu planning, or family consumption choices. Respondents were included if they were residents of the selected locale, involved in household food decision-making, willing to participate, and able to provide informed consent.

Sampling Technique

The study used a multistage sampling approach. Selected communities were identified to represent varied household contexts. Respondents were then chosen based on their involvement in household food purchasing, preparation, or decision-making. Where complete household lists were unavailable, purposive and convenience sampling were used to reach qualified and willing respondents.

Research Instrument

The primary instrument was a researcher-developed survey questionnaire based on the problem statement and the reviewed literature. The questionnaire consisted of five parts:

1. **Profile of the Respondents** – age, sex, educational attainment, monthly household income, household size, food decision-making role, meat-consumption pattern, and exposure to alternative protein products.
2. **Level of Awareness of Cultured Meat** – familiarity with the concept, knowledge of the production process, awareness of health implications, environmental implications, ethical or animal-welfare implications, and future availability.
3. **Perceptions Toward Cultured Meat** – perceived safety, nutritional value, naturalness, taste and sensory quality, affordability, environmental benefit, ethical acceptability, and trust in science, food technology, and regulation.
4. **Level of Acceptability** – willingness to try, purchase, serve to family members, substitute for conventional meat, pay for, and recommend cultured meat.
5. **Barriers and Enabling Factors** – concerns, motivating factors, and suggested strategies to improve consumer readiness.

A five-point Likert scale was used to interpret awareness, perceptions, acceptability, barriers, and enabling factors.

Data Gathering Procedure

Permission was obtained from the relevant community or institutional authorities before data collection. Respondents were informed about the purpose of the study, the voluntary nature of participation, the confidentiality of responses, and their right to withdraw. A neutral information brief was provided to explain cultured meat as meat produced from animal cells under controlled conditions. The brief avoided persuasive or promotional language to reduce response bias.

Data were gathered through printed questionnaires, online forms, or assisted survey administration. Completed questionnaires were checked for completeness, encoded, tabulated, and analyzed using appropriate statistical tools.

Statistical Treatment of Data

Frequency count and percentage were used to describe the profile of respondents. The weighted mean and standard deviation were used to determine the levels of awareness, perceptions, acceptability, barriers, and enabling factors. Pearson product-moment correlation or Spearman's rank correlation was used to determine the relationship between awareness and acceptability. Independent samples t-

test, Mann–Whitney U test, one-way ANOVA, or Kruskal–Wallis test were used to determine differences in acceptability across respondent groups. The level of significance was set at 0.05.

Ethical Considerations

The study observed ethical standards in research involving human participants. Participation was voluntary, and informed consent was secured. Respondents' identities were kept confidential, and data were reported in aggregate form. The study avoided misleading, promotional, or fear-inducing descriptions of cultured meat. Since food choices may involve personal, cultural, ethical, health, and religious beliefs, all responses were treated with respect and neutrality.

Results

Profile of the Respondents

A total of 320 household consumers participated in the study. Most respondents were female (61.25%), while male respondents accounted for 38.75%. The largest age group was 26–35 years old, accounting for 32.50%, followed by 36–45 years old at 24.38% and 18–25 years old at 22.50%.

In terms of educational attainment, most respondents were college graduates (46.25%), followed by college-level respondents (23.75%). For monthly household income, the largest group earned ₱10,001–₱20,000, representing 28.44%, followed by ₱20,001–₱30,000 at 25.63%.

Most households had 3–4 members (42.81%), followed by 5–6 members (33.13%). In household food decision-making, 41.25% were the main decision-makers, while 36.88% shared decision-making. Most respondents consumed meat either daily or 4–6 times a week. Only 34.06% had prior exposure to alternative protein products, while 65.94% had no exposure.

These results indicate that the respondents were relevant to the study because most were active participants in household food decisions and regular meat consumers.

Level of Awareness of Cultured Meat

The respondents had a **moderate level of awareness** of cultured meat, with an overall mean of 2.77. The highest-rated indicator was awareness of cultured meat as a possible future food product, with a mean of 3.02. This was followed by awareness of environmental implications (mean 2.91) and ethical or animal-welfare implications (mean 2.83).

The lowest-rated indicator was knowledge of how cultured meat is produced, with a mean of 2.48, interpreted as low. This suggests that respondents may have heard of cultured meat but had limited understanding of cellular agriculture, cell cultivation, or the actual production process.

Perceptions Toward Cultured Meat

The respondents' overall perception of cultured meat was **moderate**, with an overall mean of 3.31. The highest-rated perception indicators were perceived environmental benefit (mean 3.67), ethical acceptability (3.58), and trust in science, food technology, and regulation (3.49), with perceived affordability at 3.42.

However, perceived naturalness had the lowest mean, 2.54, which is interpreted as low. This indicates that while respondents recognized the possible environmental and ethical advantages of cultured meat, they tended to perceive it as less natural than conventional meat. This finding suggests that perceived artificiality may be a major barrier to household acceptance.

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Level of Acceptability of Cultured Meat

The overall acceptability of cultured meat for household consumption was **moderate**, with an overall mean of 3.23. Among the acceptability indicators, willingness to try had the highest mean, 3.62, which is interpreted as high. This indicates that respondents were relatively open to tasting or experiencing cultured meat.

However, willingness to purchase, willingness to serve to family members, willingness to substitute cultured meat for conventional meat, willingness to pay, and intention to recommend were all rated moderate. Willingness to pay received the lowest mean of 2.94. These findings show that curiosity toward cultured meat is higher than readiness for regular household adoption.

Relationship Between Awareness and Acceptability

The study found a moderate, positive, and significant relationship between awareness and acceptability, with an r-value of 0.486 and a p-value of 0.000. This means that respondents with higher awareness of cultured meat tended to show higher acceptability.

However, because the relationship was only moderate, awareness alone does not fully explain consumer acceptance. Other factors such as perceived safety, affordability, taste expectations, family approval, trust in regulation, and cultural familiarity may also influence acceptability.

Differences in Acceptability by Respondent Profile

Significant differences in acceptability were found when respondents were grouped by age, educational attainment, monthly household income, usual meat consumption pattern, and exposure to alternative protein products. No significant differences were found by sex or household size.

The results suggest that younger respondents, respondents with higher educational attainment, those with higher income, frequent or flexible meat consumers, and those previously exposed to alternative protein products were generally more accepting of cultured meat. This implies that openness to food innovation may be shaped by education, purchasing capacity, age-related attitudes, and familiarity with alternative food products.

Barriers to Household Acceptability

The overall mean for barriers was 3.72, interpreted as a strong barrier. The strongest barriers were fear of potential health risks, doubts about food safety, perceived unnaturalness, high prices, lack of knowledge, unclear labeling, unfamiliar taste, lack of local availability, and lack of trust in food technology and regulation.

These barriers indicate that consumer hesitation is primarily linked to safety, trust, information, affordability, sensory uncertainty, and perceived artificiality. For household consumers, safety and family suitability appear to be especially important concerns.

Enabling Factors for Household Acceptability

The overall mean for enabling factors was 4.05, interpreted as strong. The strongest enabling factors were scientific evidence that cultured meat is safe, approval from government food safety agencies, clear food labels and certification, affordable prices, good taste, nutritional value, clear information on production, and expert recommendations.

These findings suggest that household consumers may become more open to cultured meat if it is supported by credible safety evidence, transparent regulation, clear labeling, reasonable pricing, and sensory familiarization.

Discussion

The findings show that household consumers had only moderate awareness of cultured meat. While many respondents were somewhat familiar with the concept, their knowledge of how cultured meat is produced remained limited. This indicates that cultured meat remains an unfamiliar food innovation among many households in Pangasinan. Since awareness is a basic condition for informed acceptance, consumer education will be necessary before cultured meat can be meaningfully introduced to household food systems.

The respondents' moderate perception of cultured meat reflects a mixed evaluation of the product. They recognized its possible environmental and ethical benefits but were uncertain about its safety, naturalness, sensory quality, and household suitability. The low rating for perceived naturalness is particularly important because food acceptance is not purely technical or rational. Consumers often associate "natural" food with health, safety, family care, and cultural familiarity. Thus, cultured meat may face hesitation if it is viewed as artificial, overly technological, or unfamiliar.

The moderate level of acceptability indicates that cultured meat has potential but is not yet fully ready for household adoption. The high willingness to try suggests curiosity and openness to innovation. However, lower ratings for willingness to purchase, serve, pay for, and substitute cultured meat for conventional meat indicate that trial interest does not automatically lead to regular consumption. For cultured meat to become acceptable in household settings, it must be safe, affordable, palatable, accessible, clearly labeled, and compatible with familiar meals.

The significant positive relationship between awareness and acceptability confirms that better-informed consumers are more likely to accept cultured meat. This supports the importance of public education and transparent communication. However, because the relationship is only moderate, information campaigns should not focus solely on awareness. They should also address safety assurance, taste, affordability, labeling, regulation, cultural compatibility, and family-level concerns.

The significant differences in acceptability by age, education, income, meat consumption patterns, and exposure to alternative proteins indicate that acceptance of cultured meat varies across consumer groups. Younger and more educated respondents may be more open to biotechnology and sustainability-oriented food innovations. Higher-income respondents may also be more willing to consider new food products, especially if the initial price is high. Prior exposure to alternative proteins appears to reduce unfamiliarity and may increase openness to cultured meat.

The identified barriers show that household acceptance depends strongly on trust. Fear of health risks, doubt about food safety, perceived unnaturalness, and unclear labeling can reduce consumer willingness to purchase or serve cultured meat. These concerns are especially important in household settings because consumers are responsible not only for themselves but also for family members. Therefore, communication about cultured meat must be clear, evidence-based, and supported by credible regulatory approval.

The enabling factors provide a practical direction for market readiness. Scientific proof of safety, government approval, clear certification, affordability, good taste, nutritional value, and expert endorsement were identified as major conditions for acceptance. This suggests that the introduction of cultured meat should be accompanied by consumer education, regulatory transparency, sensory familiarization, and responsible sustainability communication.

Overall, the study indicates that cultured meat has potential as a sustainable protein alternative for household consumption, but acceptance remains conditional. Consumers are open to learning and trying cultured meat, but they require stronger assurance regarding safety, naturalness, affordability, taste, regulation, and family suitability. A consumer education and market-readiness framework should therefore include awareness building, food safety and regulatory assurance, nutritional and

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sensory familiarization, affordability and accessibility strategies, and balanced sustainability communication.

AI Declaration Statement:

AI-supported tools helped with grammar and structure in creating this article. No AI tools were used to collect, analyze, or interpret data; all authors are credited for their academic contributions.

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