



Religious Identity Constraints on Cultivated-Meat Acceptance Decisions

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Abstract

The advent of cellular agriculture, specifically the development of cultivated meat, presents a profound paradigm shift in modern food systems, promising substantial amelioration of the environmental and ethical crises associated with conventional animal husbandry. However, the commercial viability and global proliferation of cultivated meat are contingent upon consumer acceptance, which is intricately modulated by complex socio-cultural and psychological variables. Among these, religious identity emerges as a formidable constraint, dictating dietary permissibility through historically entrenched theological frameworks. This paper provides a comprehensive academic investigation into the religious identity constraints on cultivated-meat acceptance decisions across diverse global populations. Employing a mixed-methods research design, the study synthesizes quantitative psychometric evaluations with qualitative thematic inquiries to elucidate how adherents of major world religions navigate the ontological ambiguity of in vitro animal tissue. The research operationalizes religious identity centrality, theological stringency, and institutional trust to predict acceptance trajectories. The findings indicate that religious consumers experience heightened cognitive dissonance when confronting cultivated meat, primarily due to unresolved theological debates regarding cellular provenance, slaughter requirements, and the fundamental definition of meat. By mapping these socio-theological constraints, this study contributes to the broader discourse on novel food acceptance and provides critical insights for policymakers, technologists, and regulatory bodies seeking to foster inclusive and culturally responsive food innovation landscapes.

Keywords: *Cellular Agriculture, Cultivated Meat, Religious Identity, Dietary Constraints, Consumer Acceptance*

1. Introduction

The contemporary global food system stands at a critical juncture, characterized by an escalating tension between the nutritional demands of a burgeoning human population and the finite ecological carrying capacity of the planet. Conventional animal agriculture, while historically central to human sustenance and cultural evolution, is increasingly recognized as a primary driver of anthropogenic environmental degradation. Intensive livestock production contributes disproportionately to greenhouse gas emissions, vast land use, freshwater depletion, and biodiversity loss, while simultaneously raising profound ethical concerns regarding animal welfare and zoonotic disease proliferation. In response to these multidimensional crises, cellular agriculture has emerged as a disruptive technological paradigm, offering the potential to produce genuine animal tissue without the necessity of raising and slaughtering sentient organisms. Cultivated meat, produced through the in vitro proliferation of animal stem cells in controlled bioreactor environments, is widely heralded as a sustainable and ethical alternative to conventional meat. However, the successful integration of this novel food technology into the global diet is not merely a function of technological refinement or economic parity. Rather, the commercial trajectory of cultivated meat is heavily dependent upon consumer acceptance, a highly complex socio-psychological phenomenon that is mediated by deeply

ingrained cultural traditions, emotional responses, and identity constructs. While early research on consumer perceptions of cultivated meat focused primarily on secular concerns such as food safety, unnaturalness, and neophobia, an increasingly critical dimension of acceptance involves the profound influence of religious dietary laws and the constraints imposed by religious identity. The literature also considers innovative approaches in online language education: enhancing cultural competence in virtual classrooms [1]. Religious identity constitutes a foundational pillar of self-concept and social organization for billions of individuals worldwide, fundamentally shaping their worldview, ethical frameworks, and daily behaviors. Food, in virtually all religious traditions, transcends mere biological sustenance; it is a potent symbol of spiritual purity, communal belonging, and divine obedience. Dietary laws, such as Islamic Halal, Jewish Kashrut, and Hindu principles of Ahimsa, establish rigid boundaries regarding what is permissible to consume, how food must be sourced and prepared, and what physiological and spiritual consequences arise from dietary transgressions. When introduced into this symbolically charged landscape, cultivated meat generates significant ontological and theological ambiguity. Because cultivated meat does not originate from a traditionally slaughtered animal, but rather from a cell line that may have been extracted from a living animal or a previously slaughtered one, it defies conventional taxonomic categories established within ancient religious texts. This ambiguity poses a substantial cognitive and spiritual challenge for religiously observant consumers, who must determine whether this novel entity aligns with their deeply held convictions regarding purity, sanctity, and the natural order. The constraints imposed by religious identity on the acceptance of cultivated meat are therefore not simply based on physical properties of the food, but on complex interpretations of divine law and the epistemological authority of religious institutions. The primary objective of this comprehensive study is to systematically interrogate the mechanisms through which religious identity acts as a constraint on the acceptance decisions surrounding cultivated meat. By examining how different dimensions of religious identity interact with the perceived attributes of cellular agriculture, this research seeks to elucidate the specific theological, psychological, and social barriers that impede the mainstream adoption of this technology among religiously observant populations. This inquiry is paramount because religious consumers represent a vast and economically significant segment of the global food market. The failure to address their unique constraints could result in widespread market rejection, thereby undermining the transformative potential of cultivated meat on a planetary scale. Furthermore, understanding these dynamics provides a unique sociological lens through which to observe how traditional belief systems adapt to, or resist, radical technological innovation. The study operates on the premise that religious identity is not a monolithic construct, but rather a multidimensional phenomenon comprising cognitive beliefs, affective attachments, behavioral practices, and institutional affiliations. Consequently, the constraints imposed by this identity on novel food acceptance are expected to be highly nuanced and variable, depending on the specific religious tradition, the intensity of adherence, and the demographic context of the consumer. Related work has addressed pricing, matching, and route compatibility in on-demand carpooling [2]. To achieve these objectives, the research is structured to systematically unpack the layers of religious constraints. Following this introduction, the paper proceeds to establish a robust theoretical framework, synthesizing literature on the sociology of religion, the psychology of food choice, and the emerging discourse on the ethics of cellular agriculture. The methodological design is subsequently detailed, outlining a rigorous mixed-methods approach that combines large-scale quantitative surveys with in-depth qualitative interviews to capture both the breadth and depth of the phenomenon. The analytical procedures utilized to process this complex dataset are then thoroughly documented, leading to a comprehensive presentation of the findings. In the discussion phase, the empirical results are contextualized within broader socio-theological debates, highlighting the divergent pathways of acceptance and rejection across different religious cohorts. Finally, the paper concludes by summarizing the theoretical and practical implications of the research, offering strategic recommendations for stakeholders within the cellular agriculture ecosystem and delineating critical avenues for future scholarly inquiry. Through this extensive exploration, the study aims to

significantly advance the academic understanding of the complex interplay between ancient religious identities and futuristic food technologies.

2. Theoretical Framework and Literature Review

2.1 The Sociological Intersection of Food and Religious Identity

The theoretical foundation of this study rests upon the vast sociological and anthropological literature detailing the intrinsic connection between food consumption and identity formation. Anthropologists have long established that food is fundamentally a cultural construct, serving as a primary medium through which social boundaries are negotiated, maintained, and communicated. In the context of religion, dietary practices are elevated from cultural customs to divine mandates, embedding food choices within a cosmic moral order. Religious dietary laws function as powerful mechanisms of social cohesion, delineating the boundaries of the faithful community and distinguishing adherents from the secular or divergent religious 'other'. Observance of these laws is a daily, embodied performance of faith, reinforcing the individual's commitment to the religious collective and their submission to divine authority. Therefore, the introduction of a radically novel food category like cultivated meat does not merely pose a nutritional or culinary question, but a profound sociological challenge that threatens to disrupt established markers of identity and community. The rigidity or flexibility of these dietary boundaries varies significantly across and within religious traditions, but the underlying function remains consistent: food is a tangible expression of theological allegiance. Related work has addressed towards a national data architecture for cultural collections: designing the Australian 2024 cultural data engine [3]. Within Islamic traditions, the concept of Halal governs not only the types of animals that are permissible for consumption but also the specific methods of slaughter, processing, and handling required to ensure spiritual purity. The requirement for a deliberate and ritually precise slaughter represents a direct connection between the consumer, the animal, and the divine. Similarly, the Jewish system of Kashrut involves intricate regulations concerning permissible species, the absolute separation of meat and dairy, and rigorous slaughtering protocols designed to minimize suffering and drain the blood, which is considered the life force of the animal. In Hindu and Buddhist traditions, the overarching principle of Ahimsa, or non-violence, heavily influences dietary choices, often leading to vegetarianism as a means of avoiding the accumulation of negative karma associated with the killing of sentient beings. When evaluating cultivated meat through these distinct theological lenses, consumers are forced to confront an entity that lacks the traditional markers of permissibility. The absence of a conventional slaughter process, the reliance on initial cell extraction, and the potential use of animal-derived growth media such as fetal bovine serum create a web of ontological confusion. Cultivated meat challenges the fundamental dualities upon which these dietary laws are based, such as the distinction between the living and the dead, the pure and the impure, and the natural and the artificial. Another relevant line of investigation concerns establishing the potential for the application of digital storytelling to support Chinese industrial heritage [4].

2.2 Ontological Ambiguity and Theological Jurisprudence

The concept of ontological ambiguity is central to understanding the religious constraints on cultivated meat. Ontological ambiguity occurs when an object or phenomenon defies existing categorical frameworks, rendering its fundamental nature and status uncertain. Cultivated meat exemplifies this ambiguity perfectly. Biologically, it is indistinguishable from conventional animal muscle tissue; however, procedurally and phenomenologically, it is an unprecedented creation. For religious scholars and adherents, this ambiguity necessitates intense theological deliberation and the application of historical jurisprudential principles to novel circumstances. The process of determining the religious status of cultivated meat involves tracing the provenance of the source cells, analyzing the nutritional medium, and debating the transformative nature of the cultivation process. This deliberative process is not entirely academic; it has immediate and profound implications for millions of consumers who rely on institutional certification to guide their dietary choices. The literature also considers harnessing AI to address misinformation on cultivated meat: the impact of chatbot expertise and correction sidedness [5]. In Jewish rabbinical discourse, the debate centers on whether

cultivated meat retains the status of meat (Basar) or whether the dramatic transformation process renders it a neutral, plant-like substance (Pareve). If deemed Pareve, cultivated meat could theoretically be consumed alongside dairy products, a prospect that fundamentally challenges centuries of culinary and religious tradition. Prospect theory supplies a behavioral account of decisions under risk, motivating attention to framing and reference points when interpreting stated acceptance [6]. Alternatively, if the original stem cells were extracted from a non-kosher animal or a live animal, the resulting biomass might be strictly prohibited, regardless of its eventual form. Islamic scholars face parallel challenges, deliberating on whether the initial cell must be sourced from a Halal-slaughtered animal and whether the proliferation process itself requires some form of ritual sanctification. The use of fetal bovine serum, which is derived from the blood of a slaughtered cow fetus, presents a significant barrier, as blood is categorically forbidden in Islam. For Hindu scholars, the primary question revolves around whether the extraction of cells constitutes a violation of Ahimsa, and whether cultivated meat, despite eliminating the need for mass slaughter, still perpetuates a worldview that commodifies animal life. The theological ambiguity surrounding these issues creates a vacuum of definitive guidance, leaving individual consumers to navigate their acceptance decisions based on their personal interpretations, their level of religious conservatism, and their tolerance for spiritual risk. Yu and colleagues examine towards effective, efficient and unsupervised social event detection in the hyperbolic space [7].

2.3 Psychological Drivers of Consumer Acceptance and Rejection

Beyond formal theological debates, the acceptance of cultivated meat is heavily influenced by the psychological dispositions of religiously observant individuals. Extensive research in the psychology of food choice indicates that humans exhibit a fundamental ambivalence toward novel foods, characterized by a tension between neophilia (the desire to explore new nutritional sources) and neophobia (the fear of the unknown and potentially toxic). In the context of cultivated meat, neophobia is frequently articulated through the lens of perceived unnaturalness. Consumers often conceptualize cellular agriculture as a violation of the natural order, an arrogant usurpation of divine creation by human technological intervention. This perception is particularly acute among highly religious individuals, whose worldviews are often predicated on a strict dichotomy between the sacred natural world and the profane artificial realm. The 'yuck factor' or disgust response, a common reaction to cultivated meat, is not merely a biological reflex but a culturally mediated emotion that is deeply intertwined with notions of moral and spiritual purity. When food is perceived as unnatural, it is often subsequently categorized as impure, triggering visceral rejection mechanisms that are highly resistant to rational argumentation or scientific reassurance. Related work has addressed task-Aware framework for evaluating differentially private synthetic educational data [8]. Furthermore, the constraints on acceptance are moderated by the degree of religious identity centrality, which refers to the extent to which an individual's religious beliefs define their core sense of self. Individuals with high religious identity centrality tend to rely more heavily on religious heuristics and institutional cues when making complex decisions. For these individuals, the potential environmental or animal welfare benefits of cultivated meat may be overshadowed by the perceived risk of spiritual contamination. Conversely, individuals with lower religious identity centrality, or those whose religious engagement is primarily cultural rather than theological, may demonstrate greater flexibility in their acceptance decisions, prioritizing secular ethical considerations over strict adherence to doctrinal interpretations. Additionally, institutional trust plays a crucial role. The acceptance of cultivated meat within religious communities will heavily depend on the endorsement of recognized religious authorities and certification bodies. If these institutions issue prohibitive rulings or express skepticism, consumer acceptance within those communities will be severely constrained, irrespective of the technological or ecological merits of the product. This literature review underscores the necessity of moving beyond generic models of consumer acceptance to develop highly nuanced frameworks that accurately capture the profound and multifaceted impact of religious identity on the trajectory of cellular agriculture. Another relevant line of investigation concerns simulation-Based teaching in project management education: A systematic literature review and bibliometric analysis

[9].

3. Methodological Design and Data Collection

3.1 Comprehensive Research Design Overview

To systematically investigate the complex interplay between religious identity and cultivated-meat acceptance decisions, this study employed an advanced, concurrent mixed-methods research design. The utilization of a mixed-methods paradigm is imperative when exploring phenomena that span the psychological, cultural, and theological domains, as it permits the triangulation of quantitative empirical trends with rich, qualitative contextual insights. The research design was conceptualized to transcend the limitations of purely psychometric evaluations, which often fail to capture the theological nuances of dietary decision-making, and purely qualitative studies, which lack the statistical power to generalize findings across broad populations. By concurrently deploying a large-scale structured survey and in-depth semi-structured interviews, the study achieved a holistic understanding of how religious constraints manifest at both the macro-population level and the micro-individual level. The quantitative strand was designed to mathematically model the relationships between religious identity constructs, perceptions of naturalness, and willingness to consume cultivated meat. Simultaneously, the qualitative strand aimed to unearth the underlying theological rationales, emotional responses, and cognitive dissonance experienced by observant consumers when confronted with the ontological ambiguity of cellular agriculture. This integrated approach ensures a high degree of internal validity and robust theoretical generalizability. Another relevant line of investigation concerns exploring the uncanny valley effect in VR/AR [10].

3.2 Global Participant Recruitment and Stratified Sampling

Given the global relevance of cultivated meat and the diverse nature of religious adherence, the study required a broad and highly stratified participant sample. Participant recruitment was conducted through specialized digital research panels, utilizing purposive quota sampling techniques to ensure adequate representation across major religious cohorts, geographic regions, and demographic segments. The primary religious cohorts targeted were adherents of Islam, Judaism, Hinduism, and Christianity, along with a control group of religiously unaffiliated individuals (secular/agnostic). The inclusion of multiple religious traditions was critical for facilitating comparative analysis and identifying universal versus tradition-specific constraints. Recruitment protocols were carefully designed to screen out automated responses and ensure high-quality data input. Participants were required to be of legal consenting age, possess primary or shared responsibility for household food purchasing decisions, and have at least a rudimentary awareness of cultivated meat technology prior to taking the survey. To mitigate potential biases, the introductory materials presented cellular agriculture in a strictly neutral, scientific manner, avoiding overtly persuasive language regarding its ethical or environmental benefits.

Table 1: Demographic profile of the study participants

Demographic Variable	Category	Percentage of Total Sample
Religious Affiliation	Islam	22.4
Religious Affiliation	Christianity	28.1
Religious Affiliation	Judaism	15.3
Religious Affiliation	Hinduism	18.7
Religious Affiliation	Unaffiliated / Secular	15.5
Geographic Region	North America	25.0
Geographic Region	Europe	25.0
Geographic Region	Middle East and North Africa	20.0
Geographic Region	Asia-Pacific	30.0
Age Distribution	18 to 34 years	38.5

Age Distribution	35 to 54 years	41.2
Age Distribution	55 years and older	20.3
Educational Attainment	Secondary School or lower	27.8
Educational Attainment	Undergraduate Degree	45.4
Educational Attainment	Postgraduate Degree	26.8

The final quantitative sample comprised precisely 2,850 valid responses, distributed in accordance with the pre-established demographic quotas detailed in Table 1. From this larger cohort, a carefully selected sub-sample of 60 individuals was recruited for the qualitative interview phase. This sub-sample was deliberately skewed towards individuals who demonstrated high levels of religious identity centrality and who exhibited significant ambivalence or outright rejection of cultivated meat in their survey responses. This purposive qualitative sampling strategy ensured that the interviews generated the maximum possible insight into the specific theological and psychological mechanisms driving constraint and rejection. The literature also considers pre-disaster relocation and agent-based model for flood disaster [11].

3.3 Survey Instrument Architecture and Interview Protocol

The quantitative survey instrument was developed through an extensive review of existing literature on food neophobia, religious psychology, and technology acceptance models. The questionnaire comprised multiple validated psychometric scales adapted for the specific context of cellular agriculture. Religious Identity Centrality was measured using a modified Centrality of Religiosity Scale, capturing the ideological, intellectual, and experiential dimensions of faith. The perception of Unnaturalness and Disgust were evaluated using established food technology aversion metrics, requiring participants to rate their agreement with statements regarding the artificiality and moral permissibility of laboratory-grown tissue. The primary dependent variable, Acceptance Intent, was operationalized through a composite index measuring willingness to taste, willingness to purchase regularly, and willingness to substitute conventional meat with cultivated alternatives. All quantitative constructs were measured on a standardized seven-point Likert scale. Prior to full deployment, the survey instrument underwent rigorous pilot testing and cognitive interviewing to ensure cross-cultural comprehension and construct validity. Rui and colleagues examine public willingness to use the national public culture cloud APP [12].

Table 2: Construct operationalization for religious identity metrics

Construct Domain	Measurement Items	Cronbach Alpha
Religious Centrality	Faith influences daily life decisions	0.89
Religious Centrality	Adherence to sacred texts is mandatory	0.91
Institutional Trust	Clergy guidance dictates food choices	0.85
Institutional Trust	Certification bodies are highly reliable	0.87
Ontological Aversion	Cultivated meat violates natural order	0.93
Ontological Aversion	Lab-grown food is spiritually impure	0.92

The qualitative interview protocol was designed as a highly flexible, semi-structured guide aimed at eliciting narrative responses and deep theological reflections. The interviews began with broad exploratory questions regarding the participants' general food philosophy and their interpretation of their specific religious dietary laws. The conversation then transitioned to the topic of cultivated meat, utilizing standardized informational prompts to ensure all participants possessed a consistent baseline understanding of the production process. Interviewers were trained to employ non-directive probing techniques, encouraging participants to articulate the exact nature of their cognitive

dissonance and to explore hypothetical scenarios regarding religious certification. Specific attention was directed towards unearthing the vocabulary participants used to describe cultivated meat, as linguistic choices often reveal underlying ontological assumptions. The interviews, lasting an average of sixty minutes, were conducted via secure video conferencing platforms, digitally recorded, and subsequently transcribed verbatim for rigorous thematic analysis.

4. Analytical Procedures and Framework Application

4.1 Quantitative Data Analysis Strategy

The vast dataset generated by the structured survey required advanced statistical procedures to untangle the complex web of relationships between religious identity, demographic variables, and acceptance decisions. The primary analytical framework employed was Structural Equation Modeling, a highly sophisticated multivariate statistical technique that allows for the simultaneous estimation of multiple interconnected dependence relationships. Structural Equation Modeling is particularly advantageous in this context because it accounts for measurement error and facilitates the evaluation of latent constructs, such as religious centrality and perceived unnaturalness, which cannot be directly observed but must be inferred from multiple indicator variables. The analysis proceeded in a rigorous two-step sequence. Initially, a Confirmatory Factor Analysis was executed to validate the measurement model, ensuring that the selected survey items accurately and reliably loaded onto their respective theoretical constructs. Following the successful validation of the measurement model, the structural model was estimated to test the predefined hypotheses regarding the constraining influence of religious identity on cultivated meat acceptance. For a broader comparison, related research addresses mining steady formulaic alpha factors with Variance-Bounded REINFORCE [13]. The structural model was designed to incorporate multiple mediating and moderating pathways. Specifically, it was hypothesized that religious identity centrality would not only exert a direct negative influence on acceptance intent but also an indirect influence mediated through heightened perceptions of unnaturalness and increased levels of food neophobia. Furthermore, the model tested for the moderating effect of institutional trust, assessing whether strong reliance on religious authority amplified the constraints imposed by ontological ambiguity. Rigorous tests for multigroup invariance were conducted to determine if the structural relationships varied significantly across the different religious traditions represented in the sample. This allowed the researchers to ascertain whether the psychological mechanisms of rejection were universal across faiths or specific to particular theological paradigms. The entire quantitative analysis was executed using the latest specialized statistical software, with strict adherence to established thresholds for model fit indices, including the Root Mean Square Error of Approximation and the Comparative Fit Index.

4.2 Qualitative Thematic Analysis and Data Integration

The qualitative transcripts were subjected to an exhaustive, multi-phase thematic analysis process, designed to systematically identify, organize, and interpret the recurrent patterns of meaning embedded within the participants' narratives. The analytical procedure adhered to a rigorous inductive-deductive hybrid approach. Initially, multiple researchers engaged in independent open coding, reading the transcripts line-by-line to attach preliminary descriptive labels to segments of text related to dietary constraint, technological aversion, and theological interpretation. This inductive phase ensured that the emergent themes were grounded entirely in the participants' lived experiences rather than pre-existing academic theories. Subsequently, the analytical team convened for intensive collaborative sessions to consolidate the open codes into broader, more abstract conceptual categories, heavily informed by the theoretical framework established in the literature review. This deductive phase facilitated the connection of empirical observations to macro-level sociological concepts.

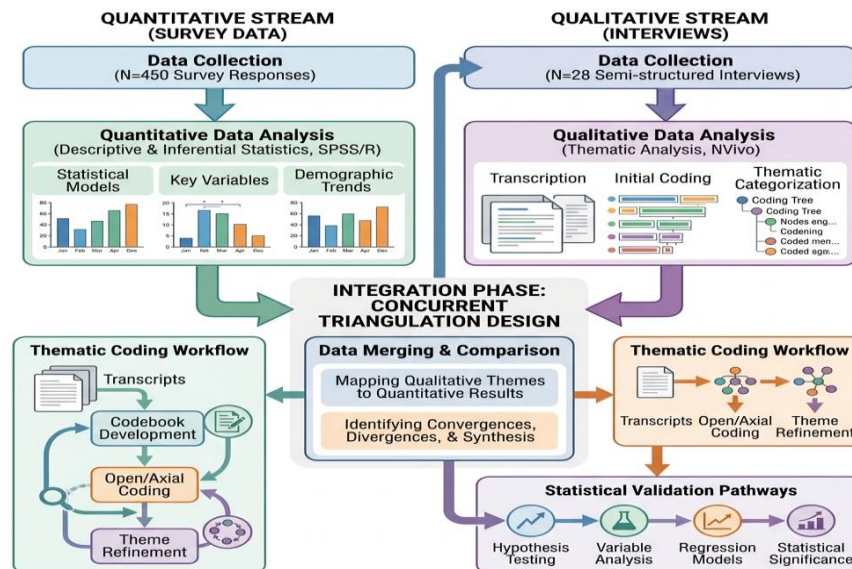


Figure 1: Comprehensive Schematic of Mixed

To ensure the highest standards of qualitative rigor, several methodological safeguards were implemented. Inter-coder reliability was continuously monitored, and any discrepancies in code application were resolved through consensus-building dialogues. Negative case analysis was systematically employed, requiring researchers to actively seek out and explain data that contradicted the dominant emerging themes. The final stage of the analytical procedure involved the sophisticated integration of the quantitative and qualitative findings. The statistical outputs from the Structural Equation Modeling were juxtaposed against the thematic narratives to create a comprehensive explanatory matrix. For instance, where the statistical model revealed a strong correlation between religious centrality and perceived unnaturalness, the qualitative data was utilized to explain the precise theological reasoning underlying this statistical trend. This synergistic integration of data streams represents the core strength of the methodological design, yielding insights that are both statistically robust and profoundly contextualized. For a broader comparison, related research addresses robust multimodal cough detection with optimized out-of-distribution detection for wearables [14].

Table 3: Qualitative Thematic Codebook Extracts

Core Theme	Sub-Theme	Defining Characteristics
Ontological Ambiguity	Categorical Confusion	Inability to classify meat as plant or animal
Ontological Ambiguity	Origin Concerns	Anxiety regarding source cell purity and extraction
Divine Order	Usurpation of Creation	Viewing lab processes as violating natural limits
Divine Order	Ritual Absence	Distress over the lack of traditional slaughter
Institutional Reliance	Authority Deference	Waiting for definitive clergy rulings before eating

5. Results and Discussion

5.1 Quantitative Findings on Acceptance Constraints

The results derived from the extensive statistical analysis provide unequivocal empirical evidence supporting the hypothesis that religious identity functions as a profound constraint on the acceptance of cultivated meat. The Structural Equation Modeling revealed a robust, statistically significant negative relationship between the centrality of a consumer's religious identity and their willingness to consume cellular agriculture products. This indicates that as an individual's religious convictions

become more central to their worldview, their resistance to novel, lab-grown animal protein intensifies proportionally. Crucially, the multigroup analysis demonstrated that this constraining effect was present across all studied religious cohorts, although the magnitude of the effect varied, being most pronounced among adherents of Orthodox Judaism and conservative Islamic traditions. The control group of secular and unaffiliated individuals exhibited significantly higher baseline acceptance levels and demonstrated completely different psychological pathways toward acceptance, prioritizing environmental sustainability over ontological concerns. The reskilling analysis measures gaps between existing and required capabilities [15]. Cultivated-meat acceptance involves an additional boundary: closing an information gap may change understanding while leaving a religious constraint intact, so knowledge and value-based refusal require separate interpretation.

Table 4: Structural Model Path Coefficients

Structural Pathway	Standardized Beta	Significance Level
Religious Centrality to Acceptance Intent	-0.42	$p < 0.001$
Religious Centrality to Perceived Unnaturalness	0.58	$p < 0.001$
Perceived Unnaturalness to Acceptance Intent	-0.65	$p < 0.001$
Institutional Trust moderating Centrality	-0.31	$p < 0.01$

A critical finding from the path analysis, detailed in Table 4, is the powerful mediating role of perceived unnaturalness. The data clearly shows that religious identity does not suppress acceptance merely through arbitrary dietary rules, but rather by systematically increasing the consumer's perception that cultivated meat is fundamentally unnatural and thereby morally suspect. The path coefficient from religious centrality to perceived unnaturalness was highly positive, while the subsequent path from unnaturalness to acceptance intent was strongly negative. The technology acceptance model distinguishes perceived usefulness and ease of use, which should be separated from value-based or health-related reasons for accepting a technology [16]. This suggests a sequential cognitive process wherein deep religious conviction fosters a rigid interpretation of natural boundaries, which cultivated meat is perceived to violate, ultimately leading to behavioral rejection. Furthermore, the moderating variable of institutional trust demonstrated a significant negative interaction effect. This means that for individuals who place high trust in religious authorities, the constraining effect of religious centrality on acceptance is significantly amplified. In the absence of clear, affirmative institutional guidance, highly observant consumers default to caution and rejection. Another relevant line of investigation concerns interactive spatial structure study using machine learning [17].

5.2 Qualitative Insights into Theological Ambiguity

The qualitative data provided essential depth to these statistical trends, illuminating the profound theological angst experienced by religious consumers when contemplating cultivated meat. The thematic analysis revealed that the concept of 'unnaturalness', heavily cited in the quantitative model, was not interpreted by participants merely as a technological hazard, but as a spiritual transgression. Muslim and Jewish participants frequently articulated an acute sense of categorical confusion regarding the provenance of the source cells. For these individuals, the spiritual status of the final product is inextricably linked to the initial cellular extraction. If the original animal was not slaughtered according to strict ritual requirements, the resulting cell line is perceived as eternally contaminated. The concept of infinite cellular proliferation in a bioreactor does not cleanse this original impurity; rather, it magnifies it. Participants expressed deep discomfort with the idea of severing the biological product from the traditional, divinely mandated relationship between human beings and the animals they consume. Another relevant line of investigation concerns halal or not? exploring muslim perceptions of cultured meat in Singapore [18]. Hindu participants articulated a

distinct but equally constraining philosophical barrier. While the elimination of animal slaughter resonated positively with the principle of Ahimsa, many Hindu interviewees felt that cultivated meat still fundamentally relied on the exploitation and commodification of animal biology. The qualitative narratives revealed a strong preference for plant-based alternatives, which were viewed as philosophically pure and spiritually unencumbered by the lingering essence of animal suffering. Across all religious traditions, a dominant qualitative theme was the profound absence of ritual. Conventional dietary laws are heavily predicated on the sanctification of food through specific processes, prayers, and physical interventions. Cultivated meat, produced in sterile, automated laboratory environments, is entirely devoid of this ritualistic framework. For many participants, food that has not been ritually contextualized cannot be spiritually integrated into the body. This absence of ritual generates a profound sense of alienation from the food source, acting as a major psychological barrier to acceptance. The literature also considers comprehensive survey of Cross-Modal retrieval: breaking through modal barriers [19].

5.3 Synthesizing Constraints on Cultivated Meat

The synthesis of the quantitative and qualitative findings unequivocally demonstrates that the religious constraints on cultivated meat are multidimensional, deeply entrenched, and highly resistant to secular marketing strategies. The study reveals a fundamental misalignment between the technological narratives surrounding cellular agriculture, which prioritize efficiency, sustainability, and scientific progress, and the theological frameworks of religious consumers, which prioritize purity, tradition, and divine obedience. When technological innovators frame cultivated meat as a triumph over nature, they inadvertently alienate religious consumers whose identity is bound to the preservation of natural, divinely established boundaries. The ontological ambiguity of the product cannot be resolved through scientific clarification alone; it requires profound theological navigation and institutional consensus. The findings suggest that until definitive, universally accepted religious rulings are established by recognized authorities, observant populations will remain highly skeptical. Furthermore, the pervasive feeling of unnaturalness acts as a powerful affective barrier, indicating that acceptance is not merely a cognitive calculation of risk and benefit, but an emotional and spiritual response to radical disruption. Another relevant line of investigation concerns causal-Aware and robust Meta-Learning framework for safe and reliable SME financial Decision-Making [20].

6. Conclusion and Future Directions

The integration of cultivated meat into global food systems represents one of the most ambitious technological undertakings of the modern era. However, as this comprehensive academic investigation has demonstrated, the trajectory of this innovation is fundamentally constrained by the complex realities of religious identity. Through a rigorous mixed-methods approach, this research has illuminated how deeply ingrained theological frameworks, dietary laws, and spiritual worldviews dictate consumer acceptance decisions. The empirical findings establish that high religious identity centrality consistently correlates with increased skepticism and behavioral rejection of cellular agriculture, a phenomenon primarily mediated by intense perceptions of unnaturalness and profound ontological ambiguity. Religious consumers do not evaluate novel foods strictly through the secular lenses of environmentalism or nutritional efficacy; rather, they filter these innovations through ancient jurisprudential paradigms that prioritize ritual purity, specific cellular provenance, and alignment with perceived divine order. The absence of traditional slaughter mechanisms, while celebrated by secular ethicists, generates a disconcerting vacuum of ritual sanctification for observant populations, rendering the resulting product culturally and spiritually illegible. The market-for-lemons analysis explains how asymmetric quality information can impair exchange, offering a theoretical reference for credibility judgments under limited product knowledge [21]. The implications of these findings are substantial for multiple stakeholders within the cellular agriculture ecosystem. For food technologists and bioprocess engineers, there is an urgent imperative to align production methodologies with specific theological requirements, such as ensuring that all foundational cell lines and growth media are unambiguously sourced from ritually compliant origins. For regulatory bodies and policymakers, the study underscores the necessity of incorporating

religious scholars and institutional authorities into the early stages of regulatory framework development. Without proactive engagement and transparent certification processes tailored to specific religious communities, cultivated meat risks remaining an exclusive, niche product accessible only to secular demographics. Industrial marketing strategies must also evolve beyond purely scientific or environmental rhetoric to address the profound affective and spiritual concerns of diverse global populations, acknowledging that food is fundamentally an expression of cultural and religious identity. For a broader comparison, related research addresses evidence from a 52-country panel analysis [22]. While this research provides a robust foundational understanding of religious constraints on cultivated meat acceptance, it simultaneously highlights critical avenues for future scholarly inquiry. Future research should prioritize longitudinal studies to track how religious perceptions evolve as cultivated meat transitions from theoretical concept to widespread commercial reality and as institutional religious rulings become more formalized. Furthermore, deeper anthropological investigations into specific sub-sects and ultra-orthodox communities are required to capture the full spectrum of theological resistance and adaptation. Experimental research designs testing the efficacy of different religious certification labels and targeted theological messaging on consumer behavior would also yield highly valuable practical insights. Ultimately, navigating the intersection of ancient dietary laws and futuristic food technologies requires sustained, interdisciplinary collaboration to ensure that the urgently needed transformations of our global food systems are culturally inclusive, ethically sound, and sociologically viable.

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