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Cultivating curiosity: Consumer responses to ethical and product benefits in cultured foods

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ABSTRACT

Cultured foods have the potential to profoundly transform the food industry. However, most current research focuses on cultured meat, neglecting other cultured products and begging the question of whether different promotional approaches are suited for certain types of cultured food products than others. To bridge this knowledge gap, we carried out two studies to explore how product type (cultured meat vs. cultured fruit) and benefit type (ethical vs. product attributes such as sensory and nutritional advantages) interact in determining consumers' willingness to try the products. Study 1 findings indicate that emphasizing ethical benefits is more effective for promoting cultured meat, whereas highlighting product benefits is more effective for promoting cultured fruit. We found that curiosity, a strong behavioral motivator, mediates the interactive effect of product type and benefit type on willingness to try. This research underscores the need for marketing messages to be tailored to the distinct cultured product types and enriches the literature on curiosity as an important mechanism in the context of cultured food acceptance.

Cultured food, alternatively referred to as cell-based or lab-grown food, represents a revolutionary advancement in the space of food production. This innovative technology involves the cultivation of different types of cell tissues in controlled environments, bypassing the need for traditional agriculture or animal farming. While cultured meat, particularly beef and chicken, initially took the spotlight, the scope has expanded to include various other food products, such as cultured seafood (Ong et al., 2021; Torrella, 2022), pork (Lu, 2023), dairy (Hall, 2021), honey (George & George, 2022), and fruits (Solomon, 2023). While the benefits of cultured food are a topic of debate (Chriki & Hocquette, 2020), they are indeed multifaceted. For instance, cultured food offers a promising solution to address pressing environmental challenges associated with conventional animal farming, including reduced greenhouse gas emissions and land use (Treich, 2021). Additionally, cultured food may address ethical concerns related to animal welfare by significantly reducing the involvement of animals in the food production process. Alternately, it can also improve food security by diminishing resource-intensive farming practices, thereby advancing the cause of a more sustainable food system (Mok et al., 2020).

Despite its promising features, cultured food has faced considerable resistance from consumers (Pakseresht et al., 2022). Numerous studies, primarily focusing on cultured meat and employing intention measures due to the product's limited supply, have illuminated the barriers to consumer acceptance and the strategies to address them. For instance, concerns regarding the naturalness and safety of cultured products (Arango et al., 2023; Bryant et al., 2019), unfamiliarity with the production process (Lupton & Turner, 2018), and a perceived loss of sensory qualities (Verbeke et al., 2015), such as taste and texture, have all been identified as significant hurdles (for a review, see Deliza et al., 2023; Pakseresht et al., 2022). While substantial progress has been made in understanding consumer reactions to cultured foods, there has been limited scholarly exploration of diverse cultured food types beyond meat (Pakseresht et al., 2022).

Such a gap is particularly salient because consumers might not react uniformly to products belonging to different food categories. Consumers, for example, have been found to respond differently to several types of meat alternatives (Onwezen et al., 2021) and even to cultured products belonging to the same food category (e.g., meat: pork, beef, poultry, and lamb: Bryant, Szejda, et al., 2019). This divergence in consumer attitudes and perceptions can be attributed to the unique

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cultural, sensory, and ethical dimensions associated with various food products (Bryant, Szejda, et al., 2019; Tuorila & Hartmann, 2020).

Based on the preceding discussion, it follows that the insights from consumer studies on established food categories, like cultured meat, might not directly apply to other cultured food products. In particular, there exists a knowledge gap in understanding the relationship between the type of cultured product and the strategies employed to promote them. Then, it is unknown, partly because of the almost exclusive focus on cultured meat (Deliza et al., 2023; Pakseresht et al., 2022), whether some cultured products are better promoted through certain types of strategy whereas others by different promotional approaches. Thus, the interaction between product type and promotional strategies within the cultured food domain remains largely unexplored, leaving unanswered questions about the most effective means of introducing these innovative food alternatives to consumers.

Our primary objective is to investigate the presence of a 'congruence' effect between the type of cultured product and the associated messaging strategies employed for promotion. In our study, we focus on two distinct categories: cultured meat and cultured fruit. Congruence, in this context, refers to the alignment or compatibility between the type of cultured food product and the messaging strategy used to promote it. Cultured meat serves as one of our focal points due to its status as a paradigmatic case within the cultured food domain, as it has received extensive attention in prior research (Deliza et al., 2023; Pakseresht et al., 2022). In contrast, cultured fruit represents, to the extent of our knowledge, an unexplored category in the context of consumer preferences for cultured foods. Cultured fruit, an early-stage development product, involves lab-grown fruit tissue that excludes traditionally discarded parts. This innovation helps address climate change concerns and offers potential solutions for reducing food waste and mitigating food insecurity resulting from shifting environments (Plant & Food Research, 2023; Solomon, 2023).

These cultured food categories (meat and fruit) constitute an ideal setting to explore the interaction between the type of cultured product and approaches used to promote them, considering differences in consumer perceptions related to healthiness and risk (Grasso et al., 2014; Sütterlin & Siegrist, 2015). Indeed, our research reveals that cultured meat is more effectively promoted through a messaging strategy that emphasizes its ethical benefits, whereas cultured fruit benefits more from a messaging strategy that accentuates the product's sensory and nutritional advantages (which we term 'product benefits'). Additionally, we uncover the mechanism driving this effect: curiosity. Specifically, consumers display heightened curiosity about cultured meat after exposure to its ethical (versus product) benefits, while the reverse is true for cultured fruit—curiosity increases when exposed to its product (versus ethical) benefits.

This study makes significant contributions to the existing literature on consumer preferences for cultured food. First, we depart from the convention of focusing solely on a single product, primarily meat, and extend our examination to encompass various cultured food types. Additionally, our research pioneers the exploration of cultured fruit. By investigating the interplay between product type and messaging strategy, we shed light on a critical but previously neglected aspect of promoting cultured foods. Finally, our research not only enriches academic understanding but also offers practical implications for industry practitioners, helping them make more informed decisions about which messaging strategies are best suited for different cultured food products.

The manuscript proceeds as follows. First, we lay the foundation by providing a theoretical framework to contextualize our research. Following this, we present Study 1, where we investigate the interaction between product type (meat and fruit) and the type of benefit emphasized in promoting it (product or ethical). In Study 2, we explore the role of curiosity as a driver of the interactive effect identified in Study 1. Subsequently, we engage in a discussion of both the theoretical and practical implications of our findings. Finally, we address the limitations of our research and present avenues for future exploration.

1. Theoretical development

1.1. Congruency between food type and type of benefit

Messaging strategies play a pivotal role in the promotion of cultured food products. Within the literature, various messaging approaches have been explored to increase consumer acceptance and adoption of these innovative food alternatives. For instance, some studies have emphasized the importance of portraying the cultured products as a natural option, drawing parallels with the production processes of familiar foods like yogurt or other fermented products (Anderson & Bryant, 2018; Arango et al., 2023; Bryant et al., 2019). Additionally, other strategies have focused on providing consumers with different types of information, such as environmental considerations (van Loo et al., 2020) or details about the production process (Lupton & Turner, 2018).

Importantly, the majority of cultured food studies have been carried out in the context of meat (for reviews, see: Bryant & Barnett, 2020; Chriki et al., 2020; Deliza et al., 2023; Kouarfaté & Durif, 2023; Lewisch & Riefler, 2023; Pakseresht et al., 2022; Siddiqui et al., 2022; Tsvakirai et al., 2024). Scholarly attention to cultured food as an overarching category that includes products beyond meat has been highly limited (for a recent exception, see: Wang et al., 2024). The focus on meat has produced, on the one hand, a small but growing literature aimed at comparing cultured meat acceptability with that of conventional meat and conventional meat alternatives, such as plant-based meats, insects, algae, or hybrid meat (Bryant & Sanctorum, 2021; Cornelissen & Piqueras-Fiszman, 2023; De Oliveira Padilha, 2022; Motoki et al., 2022; Onwezen et al., 2021; van Dijk et al., 2023; van Loo et al., 2020).

On the other hand, the literature focus on cultured meat has resulted in a few studies investigating different cultured meat subcategories (Bryant et al., 2019; De Oliveira Padilha et al., 2022; Hallman et al., 2023). For instance, Bryant et al. (2019) found that a message intended to promote cultured meat (specifically, claiming that conventional meat is not as natural as people assume) produced a significantly higher willingness to pay for cultured fish sticks; this effect was only marginally significant for cultured chicken nuggets and non-significant for cultured beef. Recently, Hallman et al. (2023), in an investigation of naming effects, found that the term "cultured" did not allow consumers to differentiate between cultured salmon and wild-caught or farmed-raised salmon whereas for cultured beef a parallel phenomenon occurred when using the term "cultivated"—i.e., consumers often associated it with grass-fed beef. The authors concluded that there might be a case for adopting the terminology "cell-cultured". Studies such as these, though still within the scope of cultured meat, suggest that, just as messaging strategies and names can have different effects on consumers depending on the subcategory of meat considered (beef, chicken, etc.), consumer responses to different types of promotional strategies could differ depending on the type of cultured food considered. In this research, we focus on messaging strategies that highlight either ethical benefits or product benefits (product benefits encompassing both nutritional and sensory attributes) and investigate whether differences exist in how these messages influence consumers, depending on the type of cultured food considered, be it meat or fruit.

Research carried out within the cultured meat domain has provided evidence supporting the significance of ethical and product benefits for consumers. Ethical considerations emerge as a driver of acceptance, with research employing diverse samples underscoring how consumers perceive cultured meat as a more compassionate choice (Franceković et al., 2021). Evidence also indicates that consumer decision making is notably influenced by product attributes, specifically sensory and nutritional aspects. Studies in the United States (Gere et al., 2020), as well as in multicultural samples from Belgium, Portugal, and the UK (Verbeke et al., 2015), reveal a preference for cultured meat products that closely mimic the sensory characteristics of conventional meat. This preference arises from the perception that cultured meat's sensory traits should mirror those of traditional meat, as any deviation can lead to

rejection. Similar findings were observed in samples from Greece, Croatia, and Spain (Franceković et al., 2021), further underscoring the importance of similar sensory characteristics in boosting acceptance. On the nutritional front, research across the same multicultural sample (Belgium, Portugal, and the UK) conducted by Verbeke et al. (2015) indicates that many consumers perceive cultured meat as deficient in terms of nutritional value and, relatedly, that provision of additional nutritional information can improve acceptance, as demonstrated by Mancini and Antonioli (2019) with an Italian sample. These findings across diverse regions emphasize the importance of ethical and product benefits (both sensory and nutritional considerations) in consumers' decision-making processes and highlight their relevance to a broad spectrum of consumers.

We anticipate nonetheless that the effectiveness of such messaging strategies—i.e., the ones highlighting either ethical or product benefits—will vary depending on the specific cultured food product under consideration (meat or fruit). Based on what we call a congruency effect, we contend that cultured meat will be more effectively promoted through a message that highlights its ethical benefits, versus its product (nutritional and sensory) benefits whereas cultured fruit will be more effectively promoted through a message that highlights its product (nutritional and sensory) benefits instead of its ethical benefits.

In particular, we rely on congruence theory, and the theoretical framework of schemas (Fiske & Neuberg, 2014; Mandler, 1982; Sujan, 1985). Schemas are mental frameworks that help organize and interpret information about specific concepts or categories; they have been extensively explored in the context of consumer behavior (e.g., Farrell, 2011; Flaherty & Mowen, 2010; Lou et al., 2022), including the food domain (e.g., Blake, 2008; Hansen et al., 2009; Harrison et al., 2016; Lee & Liao, 2022). We contend that cultured meat will be more effectively promoted through a message that highlights its ethical benefits, versus its product (nutritional and sensory) benefits. The reason is that the schema associated with meat typically includes the salient recognition that it comes from an animal (Buttlar & Walther, 2018; Joy, 2010), making ethical considerations highly relevant and congruent with this schema. However, the meat schema may not inherently include the perception that meat is necessarily healthy (Shan et al., 2016; van Wezemael et al., 2010), which could make nutrition-related considerations less relevant. Conversely, the schema associated with fruits tends to prioritize attributes such as taste, texture, and health benefits (Lusk, 2019). Ethical considerations are typically less central to this schema (Dowd & Burke, 2013)—though fruit agriculture presents ethical challenges, such as disruptions to habitats and ecosystems (Davari et al., 2010). Then, we believe that cultured fruit will be more effectively promoted through a message that highlights its product (nutritional and sensory) benefits, versus its ethical benefits. Formally, congruency theory allows us to hypothesize that:

H1a. Consumers will be more willing to try cultured fruit (vs. cultured meat) when it is promoted through a message that highlights its product benefits.

H1b. Consumers will be more willing to try cultured meat (vs. cultured fruit) when it is promoted through a message that highlights its ethical benefits.

1.2. The mediating role of curiosity

Curiosity is a feeling marked by an awareness of gaps in one's knowledge that stimulates a drive to seek information and understanding (Loewenstein, 1994). Curiosity has garnered significant recognition for its substantial role in shaping human behavior. It is often celebrated as a virtue that not only fosters learning (Pluck & Johnson, 2011; Vracheva et al., 2020) but also catalyzes innovation (Celik et al., 2016; Schutte & Malouff, 2020). The desire for knowledge, rooted in curiosity, propels individuals towards exploration, discovery, and personal growth (Gallagher & Lopez, 2007). Curiosity is considered the driving force behind people's persistent pursuit of answers, encouraging them to uncover new insights and perspectives (Hsee & Ruan, 2020).

Studies have also unveiled the influence of curiosity on decision making. For example, participants in a study by Ruan et al. (2018) were asked about their awareness of a relevant fact, revealing a preference for an app that, instead of immediately providing the information, disclosed such fact after an interval (effectively sparking curiosity). Curiosity as a motivator is also a powerful cognitive state, sometimes driving individuals to engage in behaviors that may seem irrational from a strictly utilitarian perspective, a phenomenon aptly named the 'Pandora' effect (Hsee & Ruan, 2016).

Within the domain of food, curiosity has emerged as a factor influencing consumer preferences (Wang, 2019). Although this relationship has been recognized, it remains relatively underexplored in the field (Stone et al., 2022). Research examining entomophagy—the practice of eating insects as food—have demonstrated that curiosity plays an important role in shaping food acceptance (House, 2016; Stone et al., 2022). Similarly, within the emerging landscape of cultured foods, curiosity has been identified as a driver of consumer acceptance (Rombach et al., 2022). Studies focusing on cultured meat, such as those conducted by Hwang et al. (2020), Liu et al. (2021), Piochi et al. (2022), and Rombach et al. (2022) have shown the role of curiosity in shaping consumer attitudes and behaviors. Building on this stream of research establishing the importance of curiosity in the context of food, and specifically in the acceptance of cultured food, we propose that the mechanism driving the interactive effect of food type (meat versus fruit) and benefit type (ethical versus product) on willingness to try will be curiosity.

Our proposed mediation mechanism rests on the idea that curiosity is influenced by congruity—specifically following an inverted U-shaped relationship (Hebb, 1949; Loewenstein, 1994; Piaget, 1966). According to this, curiosity peaks at moderate levels of incongruity. Consequently, information that is either entirely congruent or incongruent with a schema might not spark curiosity, but moderately incongruent information is more likely to do so (Hebb, 1949; Loewenstein, 1994; Piaget, 1966). We anticipate that cultured meat will spark more curiosity when associated with ethical benefits rather than product benefits because ethical discussions surrounding meat are familiar territories and there is uncertainty about possible solutions. Cultured meat then presents a nuanced solution to a familiar issue. This new information within a recognized framework can spark curiosity as individuals seek to understand the complexities of this solution. In contrast, emphasizing product benefits for cultured meat might be too incongruent with consumers' preexisting schemas. Meat's sensory and nutritional properties are strongly associated with its animal source. For example, a review of the literature by Bryant and Barnett (2020) revealed that consumers are skeptical about cultured meat's sensory properties replicating those of conventional meat, indicating that the incongruity between the two might lead to reduced curiosity. Similarly, in the case of cultured fruit, ethical benefits may be perceived as too incongruent with the fruit schema. Typically, consumers do not associate fruit consumption with ethical issues (Dowd & Burke, 2013). Instead, they prioritize attributes such as taste, texture, sensory qualities, and health benefits when thinking about fruits (Lusk, 2019). This misalignment between ethical benefits and the traditional schema of fruit consumption may lead to less curiosity when ethical aspects are highlighted. In contrast, product benefits align more closely with consumers' existing perceptions and expectations of fruits, potentially sparking more curiosity as consumers explore the familiar attributes of the product.

Finally, following previous research on curiosity and food acceptance (House, 2016; Hwang et al., 2020; Piochi et al., 2022; Rombach et al., 2022; Stone et al., 2022), we predict that the relationship between curiosity and willingness to try will be direct so that the more curious consumers feel about a cultured food product the more willing they will be to try it. We then expect curiosity to drive the interactive effect of food type (cultured meat versus cultured fruit) and type of benefit

(ethical versus product) on willingness to try. We formally state this hypothesis below as well as present the conceptual model of our research (Fig. 1).

H2. Curiosity will mediate the interaction between cultured food type and benefit type on willingness to try.

2. Study 1

2.1. Method

Study 1 employed a 2 (cultured food: fruit vs. meat) × 2 (benefit: product vs. ethical) between-subjects design. As recommended by Simmons et al. (2011), we sought to recruit more than 50 participants per condition. Hence, we recruited 387 participants located in the U.S. from Prolific (49% female, M_{age} = 37.72, SD = 13.60). Prolific is a crowdsourcing platform similar to MTurk and research indicates that the platform yields high-quality data for online behavioral research (Litman et al., 2021; Peer, Rothschild, Gordon, Evernden, & Damer, 2022). Except for the location, no other variables were used to screen participants, making the survey open to all U.S.-based Prolific participants. A sensitivity analysis for a two-way between-subjects ANOVA involving four experimental conditions conducted using G*Power revealed that our sample size could test an estimated effect size of f = 0.14 at the α = 0.05 and power = 0.80 levels, with 4 groups.

Participants were randomly assigned to one of four experimental conditions and read a short description of cultured food products ("Cultured food products are derived from the precise cultivation of cells, providing an alternative approach to food production"). In the cultured fruit condition, participants read: "Cultured fruit is derived from cultivating plant cells, allowing for the production of fruit without the need for traditional trees, vines, or bushes". In the cultured meat condition, participants read: "Cultured meat is derived from cultivating animal cells, allowing for the production of meat without the raising and slaughtering of livestock".

Then, participants were told about the potential benefits of cultured food. In the product benefit condition, participants read: "The product aims to offer a sensory experience comparable to conventional fruit [or meat] and potential nutritional benefits". In the ethical benefit condition, participants read: "This method offers a humane alternative, addressing concerns of agriculture's disruption to natural ecosystems [or animal welfare]" in the cultured fruit and cultured meat conditions, respectively.

As the dependent variable, participants indicated their willingness to try by rating three statements (α = 0.96) on a 7-point scale (1 = not at all, 7 = very much). The statements were: "I am willing to buy cultured food when it is available in the supermarket"; "I am willing to eat cultured food regularly"; and, "I am willing to try cultured food when I have the chance" (Arango et al., 2023).

2.2. Analyses and results

We conducted a two-way ANOVA using cultured food, benefit, and their interaction as independent variables, and willingness to try as the dependent variable. Results revealed non-significant main effects of cultured food (F (1, 383 = 0.19, p = 0.664) and benefit (F (1, 383 = 0.59, p = 0.445). However, and as expected, we found a significant interaction effect (F (1, 383 = 10.15, p = 0.002, η_p^2 = 0.03).

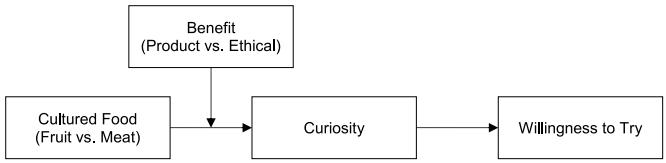

Fig. 1. Conceptual model.

As can be seen in Fig. 2, planned contrasts revealed that when promoting product benefits, participants reported a higher willingness to try cultured fruit (M = 4.61, SD = 1.69) than cultured meat (M = 3.93, SD = 2.00; F (1, 383 = 6.54, p = 0.011, η_p^2 = 0.02), consistent with H1a. In contrast, when promoting ethical benefits, participants reported a higher willingness to try cultured meat (M = 4.67, SD = 1.84) than cultured fruit (M = 4.15, SD = 1.88; F (1, 383 = 3.79, p = 0.052, η_p^2 = 0.01), consistent with H1b.

3. Study 2

3.1. Method

Study 2 employed a 2 (cultured food: fruit vs. meat) × 2 (benefit: product vs. ethical) between-subjects design. We recruited 398 participants located in the U.S. from Prolific (50% female, M_{age} = 37.91, SD = 13.93), following a similar procedure to Study 1. A sensitivity analysis for a two-way between-subjects ANOVA involving four experimental conditions conducted using G*Power revealed that our sample size could test an estimated effect size of f = 0.14 at the α = 0.05 and power = 0.80 levels, with 4 groups.

Similar to Study 1, participants were randomly assigned to one of four experimental conditions and read a short description of cultured food products. We used identical messages to those of Study 1, but we included an image as well to increase realism (Morales et al., 2017) (either cows in the cultured meat condition or fruits in the cultured fruit condition, see Appendix). We also measured the same dependent variable – willingness to try (α = 0.94) – as in Study 1. To measure the posited mediator – curiosity, we asked participants to rate three statements (α = 0.95) on a 7-point scale (1 = not at all, 7 = very much). The statements were: "I feel curious about cultured food"; "I want to know more about cultured food"; and, "I am interested about cultured food" (Wang et al., 2023).

3.2. Analyses and results

We conducted a two-way ANOVA using cultured food, benefit, and their interaction as independent variables, and willingness to try as the dependent variable. Results revealed non-significant main effects of cultured food (F (1, 394 = 0.01, p = 0.918) and benefits (F (1, 394 = 0.99, p = 0.320). However, and as expected, we found a significant interaction effect (F (1, 394 = 9.19, p = 0.003, η_p^2 = 0.02).

As can be seen in Fig. 3, planned contrasts revealed that when promoting product benefits, participants reported a higher willingness to try cultured fruit (M = 4.16, SD = 1.48) than cultured meat (M = 3.66, SD = 1.80; F (1, 394 = 4.27, p = 0.040, η_p^2 = 0.01). In contrast, when

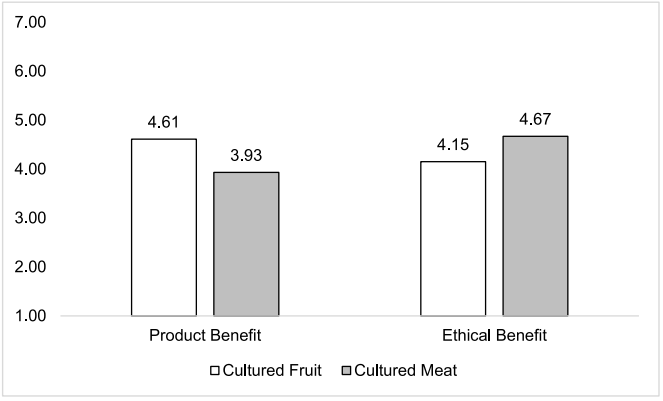

Fig. 2. Willingness to try (y-axis, 7-point likert) by cultured food and benefit (study 1).

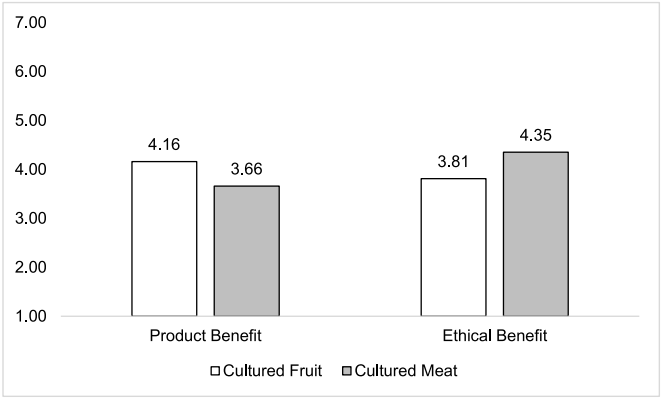

Fig. 3. Willingness to try (y-axis, 7-point likert) by cultured food and benefit (study 2).

promoting ethical benefits, participants reported a higher willingness to try cultured meat (M = 4.35, SD = 1.79) than cultured fruit (M = 3.81, SD = 1.74; F (1, 394 = 4.94, p = 0.027, η_p^2 = 0.01). These results replicated Study 1 and provided further support for H1a and H1b.

A two-way ANOVA examining curiosity revealed non-significant main effects of cultured food (F (1, 394 = 0.02, p = 0.887) and benefit (F (1, 394 = 0.81, p = 0.369). However, and as expected, we found a significant interaction effect (F (1, 394 = 10.55, p = 0.001, η_p^2 = 0.03). As can be seen in Fig. 4, planned contrasts revealed that when promoting product benefits, participants were more curious about cultured fruit (M = 4.99, SD = 1.38) than cultured meat (M = 4.41, SD = 1.93; F (1, 394 = 5.72, p = 0.017, η_p^2 = 0.01). In contrast, when promoting ethical benefits, participants were more curious about cultured meat (M = 4.81, SD = 1.69) than cultured fruit (M = 4.28, SD = 1.81; F (1, 394 = 4.85, p = 0.028, η_p^2 = 0.01).

We then conducted a moderated mediation analysis using Hayes' PROCESS Model 7 with 5000 bootstrap resamples (Hayes, 2017). The model examined the indirect effects of cultured fruit on willingness to try, moderated by benefit and mediated by curiosity, consistent with our conceptual model (see Fig. 1). Results revealed a significant index of moderated mediation (B = 0.72, SE = 0.23, 95% CI: 0.29 to 1.18), such that the indirect effects were significant in both product benefit condition (B = −0.38, SE = 0.16, 95% CI: 0.70 to −0.08) and ethical benefit condition (B = 0.35, SE = 0.16, 95% CI: 0.03 to 0.67). These findings provided evidence for H2.

4. Discussion

In this research, we conducted two studies to assess how the type of cultured food product and the type of benefit highlighted interact in determining consumer willingness to try cultured food (either meat or fruit) and the mechanism behind such effect. In the first study, we sought to establish the interactive effect of product type (meat versus fruit) and benefit type (ethical versus product) on consumers' willingness to try cultured food. Our findings revealed that consumers exhibited a greater willingness to try cultured meat when it was promoted through ethical benefits as opposed to product-related (sensory and nutritional) benefits. Conversely, consumers displayed a heightened willingness to try cultured fruit when it was promoted through product-related benefits rather than ethical benefits. To further validate and expand upon these results, we conducted a second study. In Study 2, we not only replicated the findings of Study 1 but also delved into the underlying mechanisms driving this interaction. Our results showcased that the interactive effect of product type and benefit type on consumers' willingness to try cultured food was mediated by curiosity. More specifically, when cultured meat was promoted through ethical, instead of product, benefits, consumers' curiosity about the product was significantly heightened. On the other hand, when cultured fruit was promoted through product-related, instead of ethical, benefits, it fueled greater curiosity among consumers.

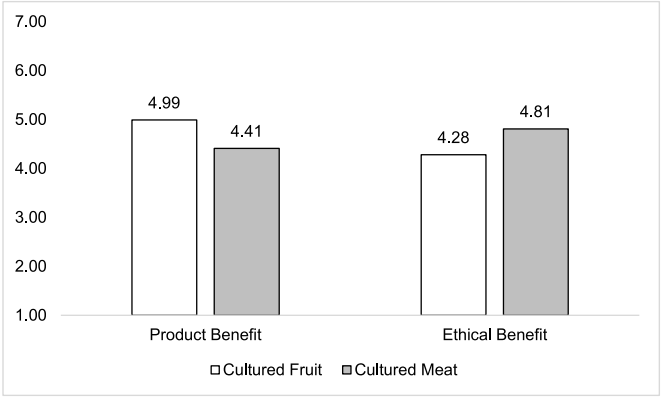

Fig. 4. Curiosity (y-axis, 7-point likert) by cultured food and benefit (study 2).

4.1. Theoretical implications

Cultured foods hold substantial promise in addressing various challenges in the global food industry (Mok et al., 2020; Treich, 2021). However, despite their numerous advantages, cultured foods, which are currently available in highly restricted supply (Eibl et al., 2021), have encountered resistance and low levels of acceptance among consumers (a fact primarily exemplified by the case of cultured meat: Onwezen et al., 2021). While existing research has predominantly centered on cultured meat and messaging strategies that might increase acceptance (e.g., Arango et al., 2023; Bryant et al., 2019), it becomes increasingly evident that findings in the context of cultured meat may not be readily applicable to other cultured food products. This study seeks to bridge this gap by exploring the dynamics of consumer acceptance within the broader domain of cultured foods. Following congruency theory and the concept of schemas (Fiske & Neuberg, 2014; Mandler, 1982; Sujan, 1985), we have demonstrated that the type of product and the type of message interact in shaping consumer willingness to try cultured meat and fruit. Even though previous research has employed congruity theory, the focus has been different, for instance on construal level (Septianto et al., 2023), not schemas.

Due to the focus on cultured meat, prior research on cultured food has mostly neglected the question of whether the effectiveness of different messaging strategies depends on the specific type of cultured food product considered. Cultured meat has been studied alongside other meat alternatives in order to compare attitudes and acceptability (Bryant & Sanctorum, 2021; Cornelissen & Piqueras-Fiszman, 2023; De Oliveira Padilha, 2022; Motoki et al., 2022; Onwezen et al., 2021; van Dijk et al., 2023; van Loo et al., 2020) but the study of different types of cultured foods—with the exception of research on different types of cultured meat (Bryant et al., 2019; Hallman et al., 2023) is an area in need of more research. This study is a contribution in this specific area and shows that the findings associated with specific types of cultured food cannot be readily extrapolated to other cultured food categories. Even though cell culture methods have been employed in the production of various foods such as yeast-based sweeteners and milk proteins (Eibl et al., 2021), and could potentially be employed in the production of fruits (one of the foci of this research), the predominant emphasis of consumer research in this field has been on cultured meat. However, to gain a comprehensive understanding, research needs to broaden its scope and investigate other cultured food products, not only meat. Consumers, as our findings indicate, are likely to perceive and react to these products differently, a result that aligns with previous research conducted in the context of cultured meat (Bryant et al., 2019; Hallman et al., 2023). Consequently, the most effective strategies for promoting

these diverse products may also vary, highlighting the necessity for a finer-grained approach in research and promotion strategies. A good starting point for exploring effective strategies in promoting these products, as we have shown, is to consider product schemas and evaluate the congruency of various messaging strategies with them.

Our study also offers valuable insights into the role of curiosity in cultured food preference, particularly within the realm of food adoption. It is worth noting that curiosity, despite its acknowledged influence on decision-making across various domains (Kidd & Hayden, 2015), has received relatively limited attention in the context of food acceptance (Rombach et al., 2022; Stone et al., 2022). This oversight is unfortunate, given that curiosity is a potent motivator of behavior, as supported by numerous studies conducted in diverse settings (Hsee & Ruan, 2016, 2020; Ruan et al., 2018). Curiosity also plays a role in shaping consumer decisions in contexts where risk perceptions are likely to be involved (Hsee & Ruan, 2020), as is the case with some cultured foods (Bryant & Barnett, 2020; Pakseresht et al., 2022). One potential explanation for the limited exploration of curiosity in the context of food consumption is the prevailing perception that curiosity primarily acts as a motivator for initiating rather than sustaining behavior (Stone et al., 2022). Thus, curiosity might motivate consumers to try cultured food (Liu et al., 2021; Piochi et al., 2022), consistent with our findings, but not to substitute conventional food with its cultured counterparts (Piochi et al., 2022). On the other hand, long-term behavior, including the adoption of new dietary choices, might frequently hinge on an initial phase of exploratory behavior driven by curiosity.

4.2. Practical implications

The key practical implication of our research is that it is fundamental to tailor messages for cultured food products based on the type of product being promoted. In light of consumers' limited attention spans (Barton et al., 2021; Carstens et al., 2018), it becomes crucial for practitioners to communicate product benefits efficiently and effectively. As we explain, practitioners should consider consumer perceptions of a product, including associated schemas, and design their messages accordingly, avoiding one-size-fits-all approaches (such as listing the multiple benefits resulting from cultured food adoption). For instance, our findings indicate that consumers are more likely to be curious about and willing to try cultured meat when ethical, instead of product-related, benefits are communicated. Therefore, messaging that stresses the right sort of product benefit is more likely to resonate with consumers. In the case of cultured meat, for example, effective communication strategies can be designed to convey ethical benefits and drive curiosity. On the other hand, when it comes to cultured fruit, our research advises drawing attention to product benefits such as taste, texture, and nutritional value to spark curiosity and encourage consumer willingness to try.

Our findings also highlight the significant role of curiosity in driving initial consumer engagement with cultured foods. This result has practical implications for how companies can encourage people to try these innovative products. Curiosity and subsequent willingness to try can be initially sparked by clearly communicating the benefits most relevant to each product (e.g., ethical benefits for cultured meat). Moreover, marketing campaigns can be crafted to generate curiosity by employing the right sort of messaging—i.e., the one that focuses on the most curiosity-inducing benefits. By harnessing the power of curiosity— through messaging that aligns with each type of cultured product—companies, and other stakeholders interested in cultured food adoption, can overcome the initial resistance often associated with novel food technologies and generate interest and excitement among potential customers.

4.3. Limitations and future research

While our study has provided valuable insights into the interaction between product type and benefit type in the context of cultured foods, it is essential to acknowledge certain limitations and suggest avenues for future research. First, it is important to recognize that our research focused primarily on the paradigmatic case of meat and the seminal case of fruit. While these products represent important categories within the cultured food domain, our findings may not fully capture the complexity of consumer reactions to a broader range of cultured products. Specifically, differences in the effectiveness of the explored messages within the cultured meat category may vary when considering sub-categories, such as cultured chicken, cultured beef, or cultured seafood. For instance, seafood is typically not considered part of the moral circle, meaning that consumers might have different ethical considerations when evaluating cultured seafood products (Lund et al., 2007). In consequence, future research should extend this investigation to encompass a more diverse array of cultured food items, such as seafood (e.g., fish), which may have unique congruency effects.

Secondly, our data collection was limited to gender and age, and we did not gather information on broader sociodemographic factors or detailed food consumption habits. Future research could benefit from a more comprehensive examination of these variables to provide a more complete understanding of their potential impact on consumer preferences for cultured food products. Third, our study relied on measures of intentions to try cultured food products. While intentions are a valuable predictor of behavior (Morwitz & Munz, 2021), future research should aim to replicate our findings in more naturalistic settings once cultured food products become widely available in the market. Examining real-world adoption behavior will provide a more robust understanding of how different product types and benefit emphases influence consumer choices.

Additionally, we acknowledge that our study utilized an online sample, which may not fully represent the diversity of consumer populations. To improve the generalizability of our findings, future research should aim to include more diverse samples, encompassing various demographic, cultural, and socioeconomic backgrounds. This will help test the robustness of the observed effects across a broader spectrum of consumers and provide a more comprehensive understanding of the factors influencing cultured food acceptance.

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Ethics approval

The study was developed in accordance with approved ethics protocols for human participants at the New Zealand Institute for Plant and Food Research Limited and ethical approval was obtained before the commencement of the data collection.

CRediT authorship contribution statement

Luis Arango: Writing – review & editing, Writing – original draft, Formal analysis. **Denise M. Conroy:** Supervision, Resources, Project administration, Funding acquisition. **Amy Errmann:** Writing – review & editing, Formal analysis, Data curation, Conceptualization. **Felix Septianto:** Writing – review & editing, Supervision, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

Appendix

Stimuli Study 2

Cultured fruit conditions

Cultured meat conditions

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