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Beyond borders: A cross-national study on cultivated meat acceptance in Italy, France, and the Netherlands

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ABSTRACT

The diffusion of cultivated meat (CM) products has been proposed as a potential strategy to mitigate the impact of conventional animal-source food production. However, consumer research on CM acceptance remains limited by lack of cross-cultural and representative studies, key aspects to draw generalisable conclusions and assess market potential. To address this gap, we conducted a cross-national online survey in Italy and the Netherlands in 2023 and in France in 2024 ($n = 1500$; quota-representative by gender, age, and education) to assess intentions, attitudes towards CM, key sociodemographic and background psychological predictors, including trust in food-safety authorities, food neophobia, technophobia, environmental concern, and natural-is-better heuristic.

Results show that Italian respondents were relatively open to CM, displaying high engagement with the topic and intention levels comparable to Dutch consumers. Intentions to try and buy CM varied between and within countries, with notably higher reluctance in western French regions. Attitudes significantly predicted intentions and were primarily shaped by psychological factors, particularly trust in food safety authorities and food technophobia. These constructs emerged as central and consistent predictors across all countries, whereas the natural-is-better heuristic was not significant and environmental concern and food neophobia influence varied by country.

Our research highlights the urgency of strengthening public trust in food-safety authorities through effective risk communication of this novel food technology and inclusive community engagement, especially as CM products potentially move closer to market approval in the European Union. Future cross-national research should prioritise regional differences and trust dynamics to better support informed consumer decision-making.

1. Introduction

Little doubt remains within the scientific community that Earth is currently well outside the safe operating space for humanity (IPCC, 2023; Persson et al., 2022). The latest measurement, published in September 2023, provides robust evidence of the crossing of six out of the nine planetary boundaries, which are crucial thresholds for maintaining the stability and resilience of the Earth system (Richardson et al., 2023; Rockström et al., 2009). In parallel, growing academic and political focus has been directed towards the anthropogenic drivers contributing to this critical situation (Fu & Waltman, 2022). Among the primary causes identified, the current production methods of our food system, particularly those related to animal-sourced foods (ASFs), are increasingly recognized as key contributors (Belete et al., 2021; Campbell et al., 2017). Indeed, despite their pivotal role in several cultures and traditions (Nordhagen, 2025), ASFs are at the crossroads of several pressing challenges of our time, being recognized as significant contributors to climate change, animal welfare issues, and biodiversity loss, as reported by the United Nations Environment Programme (UNEP, 2023).

The "protein transition" is gaining momentum among the proposed solutions to mitigate the negative impacts associated with ASFs (Duluins & Baret, 2024). While a consensus on its precise definition has yet to be reached, it is generally understood as a "shift from a diet rich in animal

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proteins to one richer in alternative protein sources" (Duluins & Baret, 2024, p.3). Notably, cultivated meat (CM) is increasingly regarded as a promising alternative protein to facilitate this transition (Benny et al., 2022).

CM is a method of producing meat inspired by regenerative medicine (Post, 2014). This process involves growing, differentiating, and structuring animal stem cells into tissues that can be used to ultimately create a variety of meat products (UNEP, 2023). While CM has raised substantial attention and considerable investment over the past decade (Song et al., 2024; Ye et al., 2022), its market availability remains scarce, with only a few companies authorized to commercialize CM products (Tavan et al., 2025). Nevertheless, many companies have submitted regulatory approval dossiers in several countries, including the European Union (Yates, 2025). Moreover, although a consensus on CM terminology has not yet been reached (Failla et al., 2025; Malerich & Bryant, 2022), several jurisdictions have proposed, and in some cases already approved, measures to regulate or restrict its nomenclature, including proposals in the EU Parliament and in various US states (European Commission, 2025; Stone, 2024). In this context, understanding consumer perceptions, as well as the psychological factors influencing CM acceptance, is of pivotal importance as these products potentially become more widely available (Lewisch & Riefler, 2023; Tsvakirai, 2024).

Recent systematic literature reviews on consumer acceptance of CM have underscored the need for future research to conduct cross-cultural studies (Hanan et al., 2024; Kouarfaté & Durif, 2023) with the same experimental design (Kombolo-Ngah et al., 2023) and to rely on representative samples beyond student populations (Onwezen & Dagevos, 2024). In this study, France, Italy, and the Netherlands have been strategically selected due to their distinct characteristics in the conventional meat production system and their crucial role in the current development and regulation of CM.

Specifically, Italy, home of one of the largest EU livestock populations (European Commission, 2024), has recently attracted international attention by becoming the first country in the world to promulgate a ban on the production and commercialization of food products derived from cell-cultured techniques (Gazzetta Ufficiale della Repubblica Italiana, 2023). This decision, accompanied by what has been referred to as a largely uninformed public discourse, ultimately led to CM becoming a highly polarized topic in the country (Bertero et al., 2023; Fino et al., 2024; Monaco, 2025). However, despite the ban, prior literature on CM acceptance indicates that Italian consumers generally have a positive perception of CM (Fantechi et al., 2025; Mancini & Antonioli, 2019; Palmieri et al., 2021; Piochi et al., 2022), although distinct clusters have been identified based on sociodemographic and psychological factors (Califano et al., 2023; Coderoni et al., 2025). Nevertheless, a common limitation of these studies is their reliance on non-representative samples of the general Italian population. A few exceptions are the studies by Fantechi et al. (2025) and Proi et al. (2025a), both of which investigated consumer perceptions and different levels of CM acceptance and engagement using a representative sample of the Italian population. However, as the authors acknowledged, the exclusive focus on a single national context may limit the applicability and transferability of their findings across culturally diverse populations, reinforcing the importance of comparative cross-cultural research.

France, the largest beef meat producer in the EU (European Commission, 2024), is currently witnessing two contrasting trends regarding the introduction of CM. On the one hand, prior studies on CM acceptance have consistently indicated a predominantly negative perception among French consumers (Hocquette et al., 2015; Hocquette et al., 2022), with significantly lower acceptance levels compared to other countries (Boereboom, Mongondry, et al., 2022;Dean et al., 2024), including findings from studies based on representative samples of the population (Bryant et al., 2020; Siegrist & Hartmann, 2020a). On the other hand, France ranks among the ten leading countries in CM investment (The Good Food Institute, 2024), supported by an industrial biotech landscape deemed promising for the future development of this emerging technology (Systemiq, 2024). Notably, in July 2024, the Paris-based company Gourmey (now Parima) reached a significant milestone by submitting the first-ever EU novel food application for CM, specifically for its cultivated foie gras products (Hockley, 2024) and obtained approval for its cultivated chicken in Singapore (Mridul, 2025). Additionally, Parima has been included in the 2025 inaugural regulatory sandbox established by the UK Food Standards Agency, a framework that may accelerate CM's introduction into the UK market within two years (Ghosh, 2025).

The Netherlands, a key producer of veal meat in the EU (European Commission, 2024), is at the forefront of food innovation in Europe (OECD, 2023), with a particularly promising ecosystem for the advancement of CM (Cellulaire Agricultuur Nederland, 2024). Dutch universities and companies have played a pivotal role in the development of CM technologies (Stephens et al., 2019; Wurgaft, 2019) and continue to lead the field, with the Netherlands ranking as the third-largest country in terms of invested capitals in CM (The Good Food Institute, 2024). Notably, the Netherlands is the only country in the EU where tasting sessions of CM are authorized, with Dutch CM companies Meatable and Mosa Meat hosting the first public events in 2024 (Fraser, 2024). In terms of consumer research on CM, the Netherlands is one of the most extensively analysed countries, as evidenced by a substantial body of peer-reviewed studies (Hanan et al., 2024; Tsvakirai et al., 2024). Previous research indicates that Dutch consumers are generally aware of CM (Rolland et al., 2020) and show openness to its consumption once it will become available (Boereboom, Mongondry, et al., 2022; Cornelissen & Piqueras-Fiszman, 2023). This has been further supported by a longitudinal study across representative groups of Dutch consumers, which observed an increase in the intention to consume CM over time (Onwezen et al., 2022a). Moreover, acceptance levels for CM in the Netherlands consistently exceed those found in other countries (Dean et al., 2024) and are higher compared to other novel food products, such as insects and seaweeds (Onwezen et al., 2022b).

While prior research has examined CM acceptance levels in each of the three countries under consideration (Kouarfaté & Durif, 2023), most of these studies rely on non-representative samples and employ non-comparable research tools, resulting in a fragmented body of literature and limited generalizability of findings (Onwezen & Dagevos, 2024). Moreover, to the best of our knowledge, no study has directly compared Italy, where consumer acceptance appears relatively high despite political policies hindering CM advancement, with France, where consumer acceptance is generally low despite a supportive political and industrial ecosystem, and the Netherlands, which combines high consumer acceptance levels with a favourable regulatory and industrial environment for CM. Moreover, to enable meaningful cross-cultural comparisons, it is essential to employ standardized measures and ask consumers the same questions across different countries (Bryant & Barnett, 2019).

To address these research gaps, the present study aims to deepen the understanding of consumer acceptance of CM by examining the psychological factors and drivers that shape attitudes and behavioural intentions levels towards CM. Drawing on representative samples of 500 participants per country, balanced by gender, age, and education level, this study enhances the comparability of findings, contributes to updating the existing literature, and establishes a benchmark for future consumer research on CM acceptance at both national and European levels.

2. Theoretical background

Given the yet-hypothetical nature of CM products, consumer acceptance is frequently operationalized through behavioural intentions, such as the willingness to taste or to purchase CM once introduced to the market (Mosikyan et al., 2024). Notably, several studies have consistently reported a higher consumer predisposition in tasting rather than buying CM (Chriki et al., 2024; Szejda et al., 2021; Wilks et al., 2019). According to the Reasoned Action Approach (Fishbein & Ajzen, 2010), behavioural intentions are considered the most proximal predictor of behaviour and are shaped by subjective norms, perceived behavioural control, and attitudes, defined as a "tendency to respond with some degree of favourableness or unfavourableness to a psychological object" (Fishbein & Ajzen, 2010, p.76). In the case of CM, however, a growing body of literature has demonstrated the central role of consumer attitudes in determining CM acceptance, including evidence synthesized in the scoping review by Tsvakirai et al. (2024b). Accordingly, while acknowledging the role of additional constructs, the present study focuses on attitudes as the key determinant of intentions. Moreover, the Reasoned Action Approach framework indicates that attitudes are in turn predicted by a set of background factors of psychological and socio-demographic nature. A wide array of such factors has been identified in the literature (Hanan et al., 2024; Mosikyan et al., 2024; Pakseresht et al., 2022). Drawing from this body of research, the present study systematically investigates key predictors of CM acceptance, focusing on the interplay between behavioural intentions, attitudes, and their underlying determinants. The following section outlines the core variables examined, followed by the research questions and hypotheses developed and tested.

2.1. Socio-demographic drivers of CM acceptance

Socio-demographic characteristics have been shown to influence CM acceptance. The ideal CM consumer is often described as younger, male, a meat consumer, and highly educated (Asioli et al., 2022; Bryant & Barnett, 2020; Califano et al., 2023; De Oliveira Padilha et al., 2021; Lanz et al., 2025). Among these, the focus on education levels has received considerable scholarly attention, with Hanan et al. (2024) identifying the positive association between higher education and greater acceptance of CM as one of the "most significant and conclusive findings in most articles" (p. 14). However, some studies supporting this association have relied on samples with a disproportionate representation of highly educated respondents, which has been noted as a limitation (Kombolo-Ngah et al., 2023; Valente et al., 2019). Moreover, studies by Hocquette et al. (2015) and Bryant and Barnett (2019) found no significant evidence supporting this relationship, highlighting the need for further investigation using more representative samples to clarify the influence of education levels on CM acceptance.

2.2. Food neophobia

Food neophobia, a personality trait defined as "a reluctance to eat and/or avoidance of novel foods" (Pliner & Hobden, 1992, p. 105) has emerged as a particularly influential factor in the CM acceptance process. While food neophobia serves a protective function, which, in human evolution, allowed for the avoidance of potentially poisonous new foods, it simultaneously limits the satisfaction of the human need for dietary variety, ultimately contributing to what has been termed "the omnivore's dilemma" (Pollan, 2008; Rozin, 1976). Previous studies have found food neophobia to be negatively related to favourable attitudes towards CM, suggesting that neophobic individuals are generally less inclined to accept CM products (Fantechi et al., 2025; Kamei et al., 2024; Siegrist & Hartmann, 2020a).

2.3. Food technology neophobia

The reliance of CM production on novel food technologies has led scholars to identify a psychological barrier of acceptance specifically related to the technological nature of CM: food technology neophobia, or the reluctance to try food produced using novel technologies (Cox & Evans, 2008; Wendt & Weinrich, 2023). Previous studies have demonstrated that food technology neophobia is a more influential factor than food neophobia in shaping consumer attitudes and intentions towards CM (Dupont et al., 2022; Fantechi et al., 2025; Gómez-Luciano et al., 2019). This pattern has been corroborated by the recent meta-analysis conducted by Yu et al. (2025), in which food technology neophobia emerged as the most powerful predictor of acceptance, showing a larger effect size than other predictors related to personal characteristics, including food neophobia. Nevertheless, its application in CM-specific research remains limited (Califano et al., 2023), and several scholars have recommended its systematic inclusion in future investigations (Hanan et al., 2024; Yu et al., 2025).

2.4. Natural-is-better heuristic

The technological origin of CM has led academic research to investigate the extent to which consumers perceive it as "tampering with nature" (Hoogendoorn et al., 2021; Siegrist & Sütterlin, 2017). The natural-is-better heuristic (Michel & Siegrist, 2019) suggests that consumers tend to prefer products perceived as less manipulated and more natural, associating them with authenticity, health benefits, and superior taste, all of which positively influence acceptance (Monaco et al., 2024; Román et al., 2017). In consumer research on CM, it is important to distinguish between the more general natural-is-better heuristic, which does not reference CM in the items' formulation and represents a background construct (Michel & Siegrist, 2019), and more specific measures of consumers' perceptions of CM as (un)natural. Cross-national research by Siegrist and Hartmann (2020a) has identified CM-specific perceptions of unnaturalness as a key determinant of its rejection, with notable national differences. By contrast, the natural-is-better heuristic has been scarcely studied in the CM acceptance literature (Yu et al., 2025). Consequently, this study focuses on this more general construct to assess its influence on CM acceptance.

2.5. Trust in food safety authorities and food scientists

In the market introduction of CM, national and supranational food safety authorities, such as the European Food Safety Authority (EFSA), play a critical role in providing scientific advice and conducting risk assessments (Reinhardt & Monaco, 2025). However, a positive evaluation of these agencies alone is insufficient without trust in their oversight. As a result, consumer trust has become a central focus in food system research across various product categories (Loera et al., 2022; Macready et al., 2025; Murphy et al., 2022). In the context of CM acceptance, distrust in food safety authorities (Wendt & Weinrich, 2025) and food scientists (Lewisch & Riefler, 2022) has been shown to contribute to reluctance towards this technology, with lower trust levels correlating with perceptions of CM as artificial and unappealing (Harrison & Liem, 2026; Siegrist & Hartmann, 2020a; Wendt & Weinrich, 2025).

2.6. Environmental concern

One of the key arguments advanced by CM proponents is its potential to address environmental and climate challenges, particularly through reduced greenhouse gas emissions and lower land use (El Wali et al., 2024). While the environmental benefits of CM remain a topic of scholarly debate (Hocquette et al., 2025; Risner et al., 2025), previous studies have examined the extent to which these potential benefits influence consumer perceptions of CM, particularly among individuals with varying sensitivities to environmental issues (Kouarfaté et al., 2024; Laureati et al., 2024). In this context, environmental concern, an umbrella concept encompassing "evaluation of, or an attitude towards facts, one's own behaviour, or others' behaviour with consequences for the environment" (Fransson & Gärling, 1999, p.370), has been identified as a potential predictor of CM acceptance (Lewisch & Riefler, 2023). Nevertheless, the literature review by Pakseresht et al. (2022) reported that while significant, environmental concern alone may not be the strongest motivation for consumers to refrain from conventional meat and embrace alternatives, thus suggesting more research on this construct.

2.7. Research questions and hypotheses

In light of these premises the following research questions (RQs) were addressed:

RQ1. How do levels of behavioural intention towards CM vary across France, Italy and the Netherlands?

RQ2. To what extent are behavioural intentions influenced by attitudes towards CM across France, Italy and the Netherlands?

RQ3. What socio-demographic and psychological factors influence consumer attitudes towards CM across France, Italy and the Netherlands?

Accordingly, and building on the Reasoned Action Approach framework and prior literature, the following hypotheses (Hps) were formulated and tested:

Hp1. Behavioural intentions towards CM differ significantly across the three European countries analysed.

Hp1.1. Dutch consumers show the highest intentions towards CM, followed by Italian and French consumers.

Hp1.2. Levels of willingness to try CM are higher than willingness to buy it.

Hp2. Behavioural intentions towards CM are significantly determined by consumer attitudes towards CM.

Hp3. Being male, younger, a meat eater and highly educated positively influence more favourable consumer attitudes towards CM.

Hp4. Consumer attitudes towards CM are negatively influenced by food neophobia, food technology neophobia, and the natural-is-better heuristic, while positively influenced by trust in food safety authorities and food scientists, as well as environmental concern.

Hp4.1. Food technology neophobia exerts a stronger negative effect on consumer attitudes towards CM than food neophobia.

3. Materials and methods

3.1. Procedure and participants

Data for this study were collected through an online survey administered in Italy, the Netherlands, and France by Ipsos, a professional market research institute, using their proprietary online consumer panel. The survey employed the Computer-Assisted Web Interviewing (CAWI) method and was conducted independently across the three countries by the same research institute to ensure consistency in data collection procedures. The geographical division adopted corresponded to macro-areas derived from the 20 administrative “Regioni” in Italy, the 12 Dutch “Provincies”, and the 22 French “Régions”, as defined prior to the 2016 French territorial reform (Loi n. 2015-991, 2015). This geographical classification reflects the standard approach used by the panel provider for panel management and quota sampling. Further details on the geographical division for each country are provided in Appendix A.

The data collection periods were as follows: Italy in April 2023; the Netherlands in April 2023; and France between March and April 2024. The difference in timing across countries reflects practical constraints in the availability of project funding and is acknowledged as a limitation (see Limitations section). Despite this, the survey instrument, the procedures and the polling institute responsible for conducting the surveys were identical in all countries. Quota sampling was applied according to age (18–24, 25–34, 35–44, 45–54, 55–65), gender, and education levels (low, middle, high), in order to reflect the sociodemographic structure of the working-age population in each country. Any respondents below 18 years old or over 65 years old were excluded.

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Bioethics Committee of the University of Turin (Approval No. 0212054), and all participants provided informed consent prior to participation. Compensation was provided through Ipsos' standard panel reward system.

3.2. Measures

The survey consisted of three main sections. The first aimed to collect sociodemographic information about the respondents; the second focused on background psychological constructs; and the third introduced the concept of CM and included measures of attitudes and behavioural intentions related to CM products. The full questionnaire is provided in Appendix B.

Sociodemographic characteristics included: age range, gender, region of residence, education level, and dietary style (omnivore, vegetarian, vegan, or others). The nationality of participants was verified by the panel provider to ensure that all respondents were residents of the respective target countries.

Psychological background variables were measured using validated scales, presented in the following order:

Natural-is-better heuristic: Nine items from the validated scale developed by Michel and Siegrist's (2019).

Trust in food safety authorities and food scientists: Four items adapted from the cross-cultured study by Siegrist and Hartmann (2020a) to assess how much respondents trust different food safety authorities and scientists researching on food. Authorities included extra-European (e.g., the Singapore Food Agency), European (e.g., EFSA), and national agencies (e.g., CNSA for Italy, NVWA for the Netherlands, and Anses for France), whereas biotechnologists and veterinarians were given as examples of scientists involved in food research.

Environmental concern: Four items adapted from Suki (2013).

Food neophobia: Ten items from the food neophobia scale originally developed by Pliner and Hobden (1992). For the Italian sample, the validated Italian version by Guidetti et al. (2018) was employed.

Food technology neophobia: Six items from the food technology neophobia scale by Cox and Evans (2008), informed by its adaptation in Verbeke (2015) and Boereboom, Sheikh, et al. (2022).

Following the second section, participants were introduced to the concept of CM. To ensure a consistent understanding, they were shown a simplified visual representation of the production process, along with the following explanatory text: *“In the European Union, cultivated meat is currently unavailable, although several companies are working to enhance its production with the aim of introducing new foods to the market.”* (Appendix B). In the absence of a formal legal definition, the term “cultivated meat” was adopted in line with the terminology recommended by the United Nations Environment Programme (UNEP, 2023), and consistent with its use in the cross-national studies by Morais-da-Silva et al. (2022) and Szejda et al. (2021).

Participants were then asked to indicate their level of interest in CM using a 5-point Likert scale ranging from 1 (“Not at all interested”) to 5 (“Extremely interested”). In addition, awareness and engagement with the topic were assessed through a series of dichotomous (Yes/No) questions. Specifically, participants were asked whether they had previously heard of CM, discussed it with friends or significant others, searched for information about it, read information on institutional websites (e.g., EFSA or scientific publications), or signed a petition against CM. These items were included solely to provide a descriptive understanding of participants' initial engagement with CM and were followed by the core outcome measures regarding CM acceptance:

Attitudes towards CM: Thirteen semantic differential items adapted from Dupont et al. (2022).

Behavioural intentions: Two items measuring willingness to try (WTT) and buy (WTB) a CM burger, adapted from Mancha and Yoder (2015), and informed by behavioural definitions in Redman and Redman (2014) and La Barbera et al. (2021).

Items were measured using different response scale formats depending on the specific variable; Response scales were retained as in the original versions of the instruments in order to preserve the psychometric properties established in the initial validation studies and to ensure comparability of results (Table 1). In the case of attitude items, these were originally measured on a − 3 to + 3 scale. For the purposes of statistical analyses, the scale was further recoded into 1 to 7 to avoid negative values and facilitate interpretation. However, in Fig. 4, we retained the original − 3 to + 3 scoring to visually reflect the measurement scale and the centrality of 0. Items translated into Italian, Dutch and French languages were subjected to a back-translation procedure and reviewed by domain experts from different relevant disciplines. An overview of the psychological variables included in the study, alongside example items and response scale, is provided in Table 1.

3.3. Data analysis

Data were analysed using IBM SPSS Statistics version 29.0.1.0. Given the forced-response nature of the survey, no missing data were encountered. Descriptive statistics were first calculated to summarize the sample characteristics and overall responses. The reliability and internal consistency of the scales used in the questionnaire were assessed using Cronbach's α and McDonald's Omega. Scale scores were derived by calculating the mean of the items to ensure consistency in the measurement range and minimize the impact of measurement error. Group differences were examined using *t*-tests and Chi^2 tests. To assess differences between the three national groups (Italy, France, and the Netherlands), Analysis of Variance (ANOVA) was conducted, followed by Bonferroni post-hoc tests for pairwise comparisons. This Bonferroni correction controls the familywise error rate across the three pairwise comparisons, with statistical significance set at $p < 0.0167$. For ANOVA involving regional differences (Appendix A), where the number of pairwise comparisons was substantially higher, Tukey's HSD test was used to control the familywise error rate across multiple comparisons. Pearson's correlations were used to assess relationships between the variables included in the study. A simple linear regression was conducted to evaluate the effect of attitudes on behavioural intentions (i.e., willingness to try or buy a CM burger). Subsequently, a hierarchical multiple regression was performed to examine the contribution of background variables (i.e. sociodemographic and psychological variables) to attitudes towards CM.

Table 1
Overview of the psychological variables included in the study (Full questionnaire in Appendix B).

Variable	Example item	*N* of items	Response scale
Natural-is-better heuristic	It is important to me that foods contain as many natural ingredients as possible	9	Likert-type 1-Strongly disagree to 6-strongly agree
Trust in food safety authorities and scientists	How much trust do you have in each of the subjects below? (Food scientists, national, European, extra-European food safety authorities)	4	Likert-type 1-No trust to 5- full trust
Environmental Concern	Environmental issues are an emergency issue	4	Likert-type 1-Strongly disagree to 5-strongly agree
Food Neophobia	I am constantly sampling new and different foods	10	Likert-type 1-Not at all to 5-Completely
Food Technology Neophobia	There are plenty of tasty foods around, so we don't need to use new food technologies to produce more	6	Likert-type 1-Strongly disagree to 5-strongly agree
Attitudes (Att)	In my opinion, cultivated meat could be…a bad idea – a good idea	13	Semantic differential scale -3 to +3
Willingness to try (WTT)	If tomorrow they offered you a cultivated meat burger, how likely do you think it is that… You would decide to taste it	1	Likert-type 0-Improbable to 10- Probable
Willingness to buy (WTB)	If tomorrow they offered you a cultivated meat burger, how likely do you think it is that… You would decide to buy it	1	Likert-type 0-Improbable to 10- Probable

4. Results

4.1. Respondents

In accordance with our sampling plan, 500 individuals per country participated in the survey, yielding a total sample of 1500 respondents. Sociodemographic characteristics are summarized in Table 2. Overall gender distribution was balanced, although the French sample showed a slight predominance of female respondents (51%). The oldest age group (55–65 years) was the most represented, comprising approximately one-quarter of participants ($n = 370$). Educational attainment varied markedly by country: while the overall sample was predominantly middle educated (44%), Italians exhibited a higher share of respondents with lower education levels (42%) compared to those from France (24%) and the Netherlands (12%). Vegetarian and vegan diets were a minority in all three countries; nevertheless, non–meat eaters were most prevalent in the Netherlands (15%), followed by France (10%) and Italy (8%). Finally, 95% of participants reported being primarily responsible for household food purchases, with only 82 respondents indicating otherwise.

Consumer interest in CM was generally low: 28.2% of respondents reported being “not at all interested,” and 31.9% “slightly interested,” for a combined low-interest prevalence of 60.1%. This low-interest segment was most pronounced in France (69.0%) and the Netherlands (64.6%). In contrast, Italian respondents demonstrated higher interest, with 53.2% indicating they were “quite”, “very,” or “extremely” interested in CM. Engagement patterns mirrored these results: prior awareness was highest among Dutch (71.0%) and Italian (68.0%) participants, whereas only 38.0% of French respondents had heard of CM before the survey. More than twice as many Italian respondents reported having sought information specifically about CM or consulted institutional sources on this topic compared to their French and Dutch counterparts. Notably, 15.0% of Italian respondents reported having signed a petition opposing CM, a rate appreciably higher than in the other two countries (11% in France, 9% in the Netherlands).

In summary, despite national variations, survey respondents were predominantly adult omnivores with moderate education levels, exhibited limited interest and engagement with CM, yet demonstrated baseline awareness of this food innovation (Table 2).

4.2. Scales' reliability, scores descriptive statistics and correlations

Appendix C reports the reliability indices for all scales used in the study, calculated using both Cronbach's Alpha (α) and McDonald's Omega (ω). Across the three countries, all scales demonstrated acceptable to excellent internal consistency. Reliability coefficients ranged from a lower bound of $\omega = 0.793$ for the food neophobia scale in France to a high of $\omega = 0.968$ for the attitudes towards CM scale in Italy.

Appendix D presents the bivariate Pearson correlations among the study variables, along with descriptive statistics including means,

Table 2
Participant characteristics per country.

Characteristic/country	Total n (%)	France (%)	Italy (%)	The Netherlands (%)
	1500	500	500	500
Sociodemographic characteristics				
Gender				
Male	745 (50)	245 (49)	250 (50)	250 (50)
Female	755 (50)	255 (51)	250 (50)	250 (50)
Age				
18–24	200 (13)	70 (14)	55 (11)	75 (15)
25–34	280 (19)	95 (19)	85 (17)	100 (20)
35–44	300 (20)	105 (21)	100 (20)	95 (19)
45–54	350 (23)	110 (22)	130 (26)	110 (22)
55–65	370 (25)	120 (24)	130 (26)	120 (24)
Highest level of completed education				
Low level	389 (26)	59 (12)	210 (42)	120 (24)
Middle level	666 (44)	266 (53)	205 (41)	195 (39)
High level	445 (30)	175 (35)	85 (17)	185 (37)
Diet				
Omnivore	1349 (90)	457 (92)	466 (93)	426 (85)
Vegetarian	121 (8)	37 (7)	28 (6)	56 (11)
Vegan	30 (2)	6 (1)	6 (1)	18 (4)
Engagement with CM				
Heard about CM				
Yes	889 (59)	192 (38)	342 (68)	355 (71)
No	611 (41)	308 (62)	158 (32)	145 (29)
Discussed about CM				
Yes	445 (30)	96 (19)	202 (40)	147 (29)
No	1055 (70)	404 (81)	298 (60)	353 (71)
Looked for information about CM				
Yes	316 (21)	76 (15)	172 (34)	68 (13)
No	1184 (79)	424 (85)	328 (66)	432 (87)
Read about CM on institutional sources				
Yes	287 (19)	69 (14)	167 (33)	52 (10)
No	1214 (81)	431 (86)	333 (67)	448 (90)
Signed a petition against CM				
Yes	172 (11)	48 (9)	77 (15)	47 (9)
No	1328 (89)	452 (91)	423 (85)	453 (91)

standard deviations, skewness, and kurtosis. Descriptive statistics showed that, on average, participants reported moderate attitudes towards CM (M = 3.91, SD = 1.46) and a slightly positive willingness to try it that was just above the scale midpoint (M = 5.78, SD = 3.50). Mean scores also indicated moderate levels of trust in food safety authorities and scientists (M = 3.24, SD = 0.83) and environmental concern (M = 3.75, SD = 0.94), while food neophobia was relatively low (M = 2.61, SD = 0.74). All variables exhibited acceptable skewness and kurtosis values, indicating no major violations of normality assumptions.

With the sole exception of the correlation between food neophobia and the natural-is-better heuristic ($r = 0.050, p = 0.051$), all correlations were statistically significant. Moderate positive correlations were observed between environmental concern and both the natural-is-better heuristic ($r = 0.420, p < 0.001$) and trust in food safety authorities and scientists ($r = 0.388, p < 0.001$). In contrast, the association between food neophobia and food technology neophobia was weak positive ($r = 0.160, p < 0.001$). Attitudes towards CM were positively associated with trust ($r = 0.366, p < 0.001$) and environmental concern ($r = 0.164$, $p < 0.001$), and negatively associated with the natural-is-better heuristic ($r = -0.052, p < 0.05$), food neophobia ($r = -0.178, p < 0.001$), and food technology neophobia ($r = -0.369$, $p < 0.001$). Finally, attitudes showed strong positive correlations with both WTT ($r = 0.690$, $p < 0.001$) and WTB ($r = 0.738$, $p < 0.001$), which were themselves strongly correlated ($r = 0.846$, $p < 0.001$).

4.3. Levels of the psychological background factors

Fig. 1 illustrates the levels of psychological background variables, which resulted to be statistically different between the countries analysed. Specifically, French consumers exhibited higher levels of food technology neophobia and (dis)trust in food safety authorities and scientists compared to Italian and Dutch consumers, whose scores on these measures did not significantly differ from each other. Italian respondents demonstrated the highest scores of food neophobia (M = 2.76, SD = 0.75), environmental concern (M = 3.92, SD = 0.88), and natural-is-better heuristic (M = 4.40, SD = 1.05), followed by French and Dutch consumers, respectively. Detailed means, standard deviations, and significant between-country differences are provided in Appendix E.

4.4. Behavioural intentions towards CM between and within-countries

To test Hypothesis 1 and its sub-hypotheses, differences in WTT and WTB a CM burger were analysed both between and within countries. One-way ANOVAs revealed significant between-country differences for both behavioural intentions [WTT ($F(2,1497) = 14.77$, $p < 0.001$)], [WTB, $F(2,1497) = 16.12$, $p < 0.001$)]. As illustrated in Fig. 2 and detailed in Appendix F, French consumers consistently reported significantly lower levels of intention to try and to buy a CM burger compared to their Italian and Dutch counterparts. Notably, although not

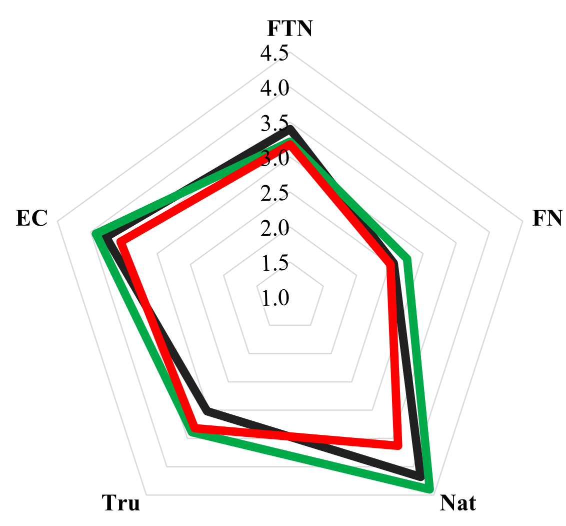

Fig. 1. Mean scores of psychological background factors across the three countries. FTN: Food Technology Neophobia, FN: Food Neophobia, Nat: Natural-is-better heuristic, Tru: Trust in food safety authorities and scientists, EC: Environmental Concern.

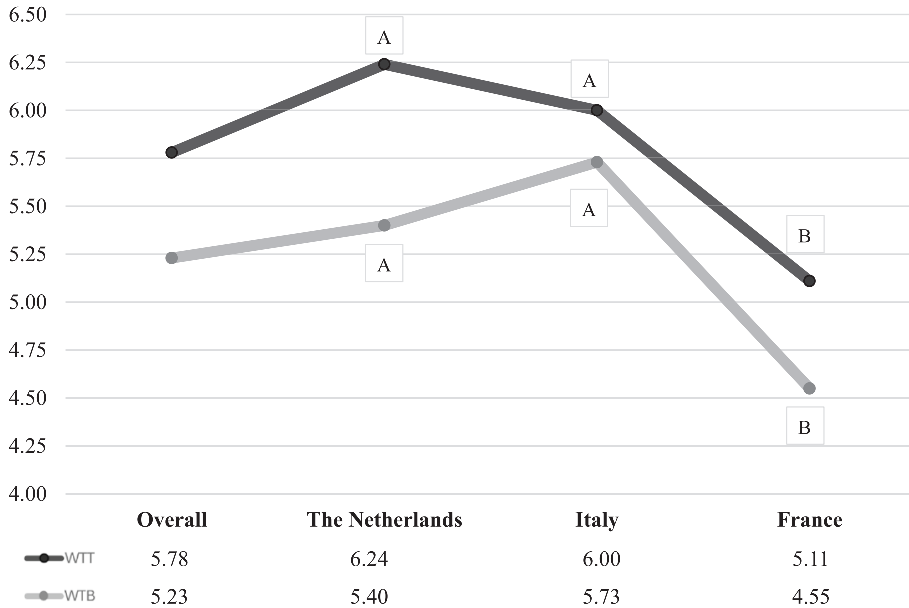

Fig. 2. Differences in levels of Willingness to Try (WTT) and Buy (WTB) a cultivated meat burger by country (The Netherlands, Italy and France) Mean scores with different letters are significantly different between the countries (Bonferroni's test, $p < 0.0167$).

statistically significant, Dutch consumers expressed slightly higher WTT scores than Italian consumers, who, in turn, reported comparatively higher WTB levels.

Beyond national-level comparisons, a closer examination of WTT and WTB scores at the regional level revealed significant differences across macro-areas of the three countries considered, providing a more detailed understanding of national results [WTT: $F(16,1483) = 3.148$, $p < 0.001$; WTB: $F(16,1483) = 3.699$, $p < 0.001$]. Specifically, Western France (i.e. Bretagne, Pays de la Loire, and Poitou-Charentes regions as prior to the 2016 French reform) consistently displayed the lowest intention levels, both for WTT ($M = 3.88$, $SD = 3.01$) and WTB ($M = 3.33$, $SD = 2.86$), with statistically significant differences compared to Southern, Central, and North-Western Italy, as well as to all Dutch provinces. Similarly, the South-West of France ($M = 4.31$, $SD = 3.25$), Bassin Parisien Est ($M = 4.33$, $SD = 2.96$) and Bassin Parisien West ($M = 4.40$, $SD = 2.99$) areas reported significantly lower WTB scores than Central Italy ($M = 6.59$, $SD = 3.21$), but not with the other Italian and Dutch areas considered. Further details are provided in Fig. 3 and Appendix F.

Notably, as determined by paired-sample *t*-tests, WTT scores were significantly higher than WTB scores in all countries (Appendix G), with Italy ($t(499) = 3.967$, $p < 0.001$), France ($t(499) = 6.052$, $p < 0.001$), and the Netherlands ($t(499) = 9.008$, $p < 0.001$).

Consequently, Hp 1 – *Behavioural intentions towards CM differ significantly across the three European countries analysed* – was only partly supported, as significant differences emerged only between French consumers and the other two groups, while no significant distinction was found between Italian and Dutch consumers. Similarly, Hp 1.1 – *Dutch consumers show the highest intentions towards CM, followed by Italian and French consumers* – was only partly supported: although French consumers consistently showed the lowest intention levels, a clear and statistically significant ranking between Dutch and Italian consumers was not observed. In practical terms, this means that French consumers

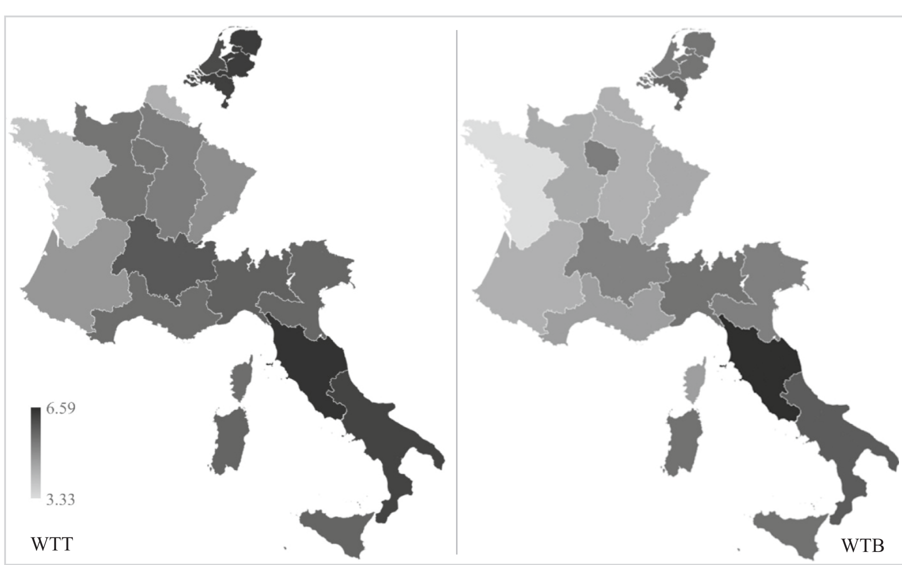

Fig. 3. Regional variation in Willingness to Try (WTT, left) and Buy (WTB, right) a cultivated meat burger. Note. Mean scores, response scale ranging from 0 to 10. Further details provided in Appendix F.

report lower intentions overall, while Italian and Dutch consumers show similar levels. Finally, Hp 1.2 – *Levels of willingness to try CM are higher than willingness to buy it* – was supported, as WTT scores were consistently higher than WTB scores across all countries considered.

4.5. Attitudes towards CM

Similar results to that observed for behavioural intentions were found in participants' attitudes towards CM across the three countries. As illustrated in the polarity profile (Fig. 4), significant differences emerged among French, Italian, and Dutch consumers for all attitude items, with the sole exception of the item related to the perceived nutritional value of CM. Overall, participants tended to associate CM with more negative attributes (left side of the figure) than with positive ones (right side). However, the strength and consistency of these associations varied by country, with Dutch and Italian respondents generally expressing more favourable attitudes, by considering CM as innovative, modern, environmentally sustainable, relatively safe for the planet, and rich in nutrients. Conversely, French participants showed more reluctance, associating CM more frequently with negative characteristics, including the perception of CM as a bad idea, harmful for the environment and for human beings, ecologically unsustainable and wrong. Notably, across all three national samples, CM was commonly perceived as unnatural, and concerns regarding its sensory attributes were evident. Respondents perceived CM as generally "disgusting," "unpleasant," and "tasteless," suggesting widespread unease about its sensory appeal. Detailed country-level means, country differences and standard deviations for each attitudinal pair are provided in Appendix H.

In order to test Hp2 – *Behavioural intentions towards CM are significantly determined by consumer attitudes towards CM* – a linear regression analysis was conducted to examine the effect of attitudes towards CM on behavioural intentions across the three countries considered. Results indicate that attitudes explained a significant and substantial proportion of variance in both WTT and WTB. Specifically, adjusted R^2 ranged from $= 0.356$ ($p < 0.001$) for WTT in France to 0.558 ($p < 0.001$) for WTT in Italy. Similarly, it ranged from 0.474 ($p < 0.001$) for WTB in France to 0.591 ($p < 0.001$) for WTB in Italy (Appendix I). Moreover, attitudes towards CM positively influenced the intention to taste and to buy a CM burger with standardized beta coefficients (β) statistically significant across all three countries and always higher than 0.60 (WTT, France) and 0.69 (WTB, France), as reported in Table 3. Consequently, Hp 2 was supported.

4.6. Predictors of attitudes towards CM

To understand the underlying predictors of attitudes towards CM and

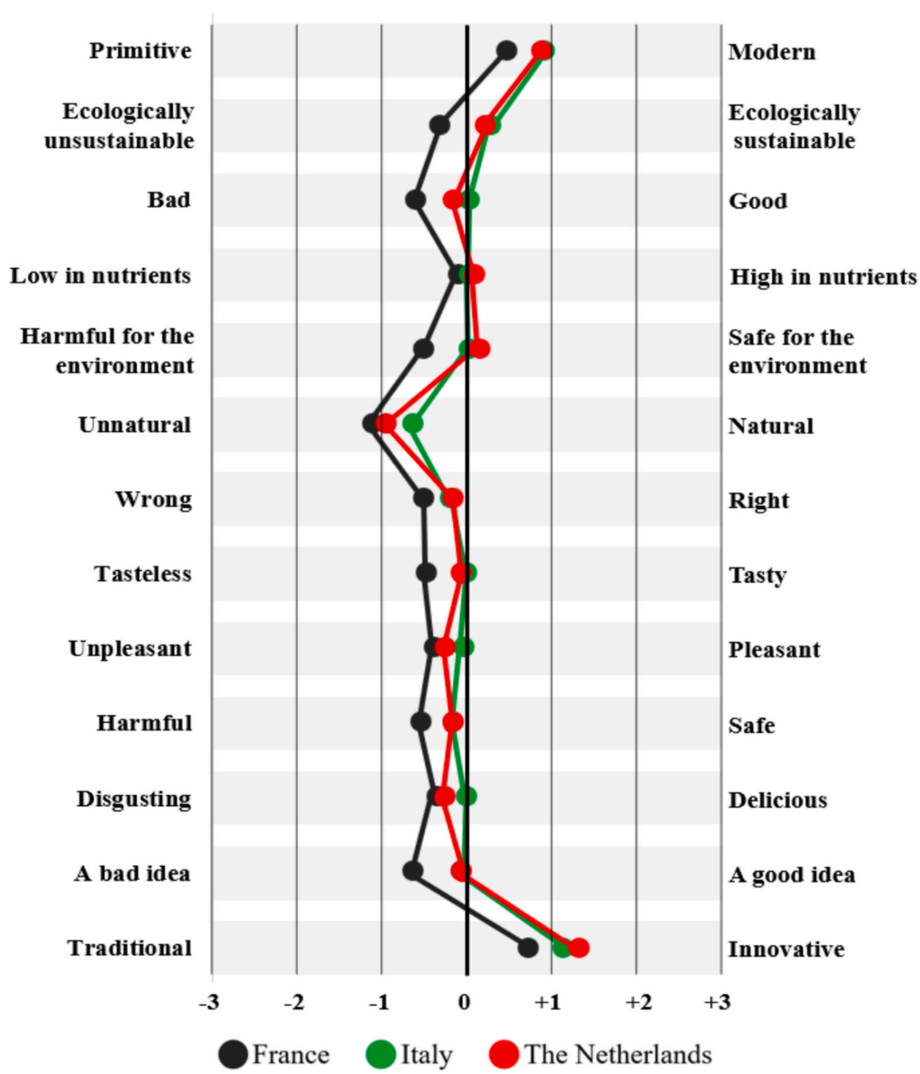

Fig. 4. Polarity profile of attitudes towards cultivated meat, mean ratings on semantic differential attribute pairs across the three countries. Scale ranges from −3 to +3, with the smallest value linked to a negative attribute (e.g. tasteless) and the highest value to a positive attribute (e.g. tasty). Further details provided in Appendix H.

Table 3
Linear regression results for the effect of attitudes on Willingness to Try (WTT) and Buy (WTB) a cultivated meat burger across Italy, the Netherlands and France.

Outcome		Italy $N = 500$			the Netherlands $N = 500$			France $N = 500$		
		B	SE	β	B	SE	β	B	SE	β
WTT	Intercept	−0.92	0.30	–	−0.65	0.34	–	−0.28	0.35	–
	Attitudes	1.70	0.07	0.75***	1.72	0.08	0.70***	1.48	0.09	0.60***
WTB	Intercept	−1.39	0.28	–	−1.69	0.31	–	−1.33	0.30	–
	Attitudes	1.75	0.07	0.77***	1.77	0.07	0.73***	1.62	0.08	0.69***

Note. B = unstandardized coefficient; *SE* = standard error; *β* = standardized coefficient. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Further details provided in Appendix I

their specifications at national level, a hierarchical multiple linear regression analysis was conducted per each nation, with hypothesised sociodemographic variables (i.e. gender, age, diet, education level) as first step and psychological variables (i.e. food technology neophobia, food neophobia, trust in food safety authorities and scientists, natural-is-better heuristic, and environmental concern) as second step (Table 4). Multicollinearity was checked using Variance Inflation Factors (VIFs), which ranged from a minimum of 1.029 to a maximum of 1.639, suggesting no cause for concern (Appendix L). In Italy, the sociodemographic variables entered at Step 1 explained a modest but statistically significant portion of the variance in attitudes (adjusted $R^2 = 0.090$, $p < 0.001$). The inclusion of psychological predictors at Step 2 led to a statistically significant increase in explained variance ($\Delta R^2 = 0.208$, $p < 0.001$), with the final model explaining 29.3% of the attitude variance (adjusted $R^2 = 0.293$). Similarly, in the Netherlands, the sociodemographic variables entered at Step 1 accounted for 8.2% of the variance in attitudes (adjusted $R^2 = 0.082$, $p < 0.001$). The inclusion of psychological predictors at Step 2 led to a substantial and statistically significant increase in explained variance ($\Delta R^2 = 0.329$, $p < 0.001$), bringing the total variance explained to 40.8% (adjusted $R^2 = 0.408$). Conversely, in France, the initial model explained only 2.9% of the variance (adjusted $R^2 = 0.029$, $p < 0.001$), suggesting a limited predictive value of sociodemographic variables alone. However, adding psychological predictors significantly increased explanatory power ($\Delta R^2 = 0.217$, $p < 0.001$), with the final model accounting for 23.9% of the variance in attitudes (adjusted $R^2 = 0.239$).

In the first step of the regression model among Italian respondents, all sociodemographic variables were significantly related to attitudes towards CM. Younger age (Age, $\beta = 0.220$, $p < 0.001$) and higher educational attainment (Edu, $\beta = 0.146$, $p < 0.001$) had a positive influence on more favourable attitudes. Additionally, being vegan or vegetarian (Diet, $= -0.102$, $p = 0.018$) and identifying as male (Gender, $\beta = 0.087$, $p = 0.043$) also showed statistically significant effects, although with smaller standardized coefficients and, in the case of diet, in the opposite direction of the one hypothesised. After introducing psychological variables in Step 2, age remained the most influential sociodemographic predictor ($\beta = 0.149$, $p < 0.001$), demonstrating a stronger effect on attitudes than gender, education, or diet. Among French respondents, only age was a significant predictor of attitudes in both steps of the regression (Step 1, $\beta = 0.189$, $p < 0.001$; Step 2, $\beta = 0.145$, $p < 0.001$), while all other sociodemographic variables were not statistically significant. Within the Dutch sample, all variables except diet had a statistically significant influence in Step 2. Specifically, being younger (Age, $\beta = 0.150$, $p < 0.001$), male (Gender, $\beta = 0.134$, $p < 0.001$) and more highly educated ($\beta = 0.130$, $p < 0.001$) were associated with more positive attitudes. However, the magnitude of these effects remained modest (Table 4).

Consequently, Hp 3-*Being male, younger, a meat eater and highly educated positively influence more favourable consumer attitudes towards CM*-was only partially supported. A positive influence was consistently observed only for age across all three countries. In contrast, the effects of gender and education were significant only in the Italian and Dutch subsamples. Finally, diet had a significant effect on attitudes only among Italian respondents, with meat eaters showing slightly less favourable attitudes than non-meat eaters, contrary to the hypothesis.

Regarding psychological variables, food technology neophobia acting as a barrier (β ranging from -0.266, $p < 0.001$, in Italy to -0.360, $p < 0.001$, in France), and trust in food safety authorities and scientists, acting as a facilitating factor of attitudes (β ranging from 0.218, $p < 0.001$, in the Netherlands to 0.267, $p < 0.001$, in France), emerged as the most consistent and influential predictors of consumer attitudes towards CM across all three countries. In contrast, the natural-is-better heuristic did not show a significant effect in any of the national subsamples. Environmental concern, while non-significant in France,

Table 4
Results of hierarchical multiple linear regression analyses predicting consumer attitudes towards cultivated meat.

		Italy $N = 500$			the Netherlands $N = 500$			France $N = 500$		
		B	SE	β	B	SE	β	B	SE	β
1	Intercept	4.21	0.26	–	3.50	0.19	–	3.19	0.22	–
	Gender	0.27	0.13	0.09*	0.51	0.13	0.18***	0.04	0.12	0.02
	Age	0.76	0.15	0.22***	0.49	0.13	0.16***	0.54	0.13	0.19***
	Education	0.60	0.18	0.15***	0.57	0.13	0.19***	0.16	0.13	0.06
	Diet	−0.62	0.26	−0.10*	−0.14	0.18	−0.04	0.21	0.22	0.04
2	Intercept	4.96	0.54	–	3.73	0.46	–	4.65	0.49	–
	Gender	0.25	0.12	0.08*	0.38	0.10	0.13***	−0.16	0.11	−0.06
	Age	0.51	0.14	0.15***	0.45	0.11	0.15***	0.42	0.12	0.14***
	Education	0.49	0.16	0.12**	0.39	0.11	0.13***	0.15	0.12	0.05
	Diet	−0.62	0.23	−0.10**	0.03	0.15	0.01	0.22	0.19	0.05
	FTN	−0.56	0.09	−0.27***	−0.75	0.08	−0.36***	−0.71	0.08	−0.36***
	FN	−0.22	0.09	−0.11*	−0.10	0.07	−0.05	−0.05	0.08	−0.02
	Tru	0.43	0.08	0.23***	0.39	0.07	0.22***	0.45	0.07	0.27***
	Nat	−0.13	0.07	−0.09	0.02	0.05	0.02	0.02	0.05	0.02
	EC	0.22	0.08	0.13**	0.30	0.07	0.20***	−0.07	0.07	−0.05

Note. Gender was coded as 0 = female, 1 = male; Age was coded as 0 = over 34, 1 = under 35 years old; Education was coded as 0 = middle or low educational attainment, 1 = high educational attainment; Diet was coded as 0 = vegan or vegetarian, 1 = omnivore. *B* = unstandardized coefficient; *SE* = standard error; *β* = standardized coefficient. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. FTN = Food Technology Neophobia; FN = Food Neophobia; Tru = Trust in food safety authorities and scientists; Nat = Natural-is-better heuristic; EC = Environmental Concern. Further details provided in Appendix L.

had a positive influence in the Netherlands (EC, $\beta = 0.202$, $p < 0.001$) and Italy (EC, $\beta = 0.127$, $p < 0.001$), confirming its facilitating role on positive attitudes towards CM. Contrary to expectations, food neophobia was significant only in the Italian sub-sample (FN, $\beta = -0.109$, $p = 0.010$), and its effect was notably weaker than that of food technology neophobia (Table 4).

Therefore, Hp 4 – *Consumer attitudes towards CM are negatively influenced by food neophobia, food technology neophobia, and the natural-is-better heuristic, while positively influenced by trust in food safety authorities and food scientists, as well as environmental concern* – was partially supported. Although the direction of effects aligned with the theoretical expectations, only food technophobia and trust emerged as consistent predictors across all national contexts. Environmental concern and food neophobia showed country-specific effects, and the natural-is-better heuristic was not significant in any context. Finally, Hp 4.1 - *Food technology neophobia exerts a stronger negative effect on consumer attitudes towards CM than food neophobia* – was supported, with technophobia consistently showing larger standardized coefficients across all countries.

5. Discussion

CM technology is framed by its proponents as a potential mitigator of the impact of current ASF production methods on planetary boundaries (Gerten et al., 2020; Li et al., 2024), by eventually offering both a sensory (To et al., 2024) and biological equivalence to conventional ASF products (Wurgaft, 2020). However, current research on consumer acceptance of CM continues to face significant challenges, including a lack of cross-cultural studies and a frequent reliance on non-representative samples (Hanan et al., 2024). This study sought to address these gaps by examining acceptance levels of CM and the underlying drivers in a representative sample of consumers from major European countries. Three research questions guided this work, which will now be discussed in light of previous literature and the present results.

RQ1 aimed to assess how behavioural intentions towards CM vary across France, Italy, and the Netherlands. Previous research has often linked Italian (Liu, Almeida, et al., 2023) and French (Liu, Chriki, et al., 2023; Siegrist & Hartmann, 2020a) reluctance towards CM to their rich culinary heritage and deep-rooted food cultures. However, the present study challenges this perspective. Italian consumers consistently reported high intentions to try and purchase CM, comparable to Dutch consumers, who are instead frequently identified as the most receptive to CM (Boereboom, Mongondry, et al., 2022; Boereboom, Sheikh, et al., 2022). Moreover, significant variation emerged within France itself: while western regions appeared particularly resistant to CM, consumers in more urbanized areas, such as the Île-de-France region, which accounts for 18% of the French population (Insee, 2023), exhibited intention levels similar to those of Italian and Dutch consumers. One potential explanation for such resistance might lie in the western regions' strong tradition of livestock farming and the role of agri-food production, with Bretagne being the leading meat-producing region in France (Insee, 2016), coupled with a pronounced regional identity (Brigevich, 2016). Historically, this region has also seen the emergence of social movements defending local agricultural practices and expressing opposition to controversial agri-food innovations, such as local protests against genetically modified organisms (Agence France-Presse, 2017). More generally, agricultural transformations in rural France have often proceeded slowly, with persistent peasant routines and resistance to change shaping the adoption of innovations in the countryside (Moriceau, 1994). In line with this broader cultural orientation, recent research has also shown that French consumers assign a high value to locally sourced foods (Horvath et al., 2024; Ipsos, 2025). Taken together, these historical and cultural factors may help explain why populations in such regions, with deep agricultural roots, exhibit greater caution towards novel food technologies such as CM. However, it would be arguable that such strong attachment to local food cultures and conventional ASF also characterises other regions included in this study, such as Corsica (Paci, 2023), the southern Italian regions (Montanari, 2010), and Friesland (Van Langevelde & Pellenbarg, 2001), suggesting that additional factors may be at play. Nevertheless, given that this regional focus represents a novel contribution to the European literature on CM acceptance, we recommend that future research move beyond national-level discussions and consider regional and local specificities. Incorporating measures such as locavorism (Reich et al., 2018), food ethnocentrism (Ferrales & Grunert, 2024), regional identity (Asún et al., 2018), and rural-urban in intention (Fernandes et al., 2022; Shaw & Mac Con Iomaire, 2019) would provide a more comprehensive understanding of these patterns. To the best of our knowledge, only Rombach et al. (2022) and Proi et al. (2025b) have included a measure of locavorism in relation to CM acceptance. However, their results were not examined through a regional lens, highlighting the need for further research in this area.

From a practical perspective, the observed regional heterogeneity in CM acceptance suggests that stakeholders aiming to promote CM should tailor communication and engagement strategies to local contexts. In regions exhibiting higher resistance, leveraging local trust brokers (e.g., community leaders or local producer associations), using region-specific communication channels, and providing opportunities for tasting or experiential learning may improve awareness, interest and reduce negative perceptions. In addition, CM could be introduced in ways that resonate with local culinary identities, for instance by incorporating CM ingredients in combination with traditional local dishes, using locally sourced plant-based media in cell cultures, or using cells derived from breeds traditionally raised in the region. Such targeted approaches can complement broader national campaigns and help ensure that CM messages and products align with both regional and national values, food cultures, and culinary traditions.

An interesting finding concerns Italian consumers, who exhibited surprisingly high engagement with CM. While national-level studies have generally reported positive intentions among Italians (Mancini & Antonioli, 2022), the only prior cross-cultural study, comparing Italian, Portuguese, and Spanish consumers (Liu, Almeida, et al., 2023; Liu, Chriki, et al., 2023), found lower acceptance among Italian-speaking participants relative to other Mediterranean countries. One possible explanation for our result may be that heightened public debate surrounding CM in Italy at the time of data collection (Bertero et al., 2023), might have increased awareness and fostered greater cognitive engagement, which might have ultimately translated into higher acceptance of CM. However, given the temporal differences in data collection across countries, this remains a tentative hypothesis and should be interpreted in light of the timing limitation discussed in the Methods and Limitations sections.

Finally, the consistently higher WTT compared to WTB represents a particularly relevant finding, in line with prior research on CM and other novel foods (e.g., Chriki et al., 2024; Szejda et al., 2021). In the absence of direct exposure, tasting behaviour may be perceived as involving a lower cognitive and behavioural commitment, whereas purchase represents a more demanding step. The latter may be constrained by additional barriers, including anticipated price concerns and the costs associated with changing established consumption habits. More broadly, this finding also resonates with theoretical perspectives that conceptualise food acceptance as a dynamic and staged process, in which sensory trial and purchase represent distinct phases characterised by progressively increasing levels of commitment (Astrini et al., 2025).

In response to RQ1, we therefore argue that significant and substantial differences in behavioural intentions do exist between the western French regions and other French, Dutch, and Italian regions, with the latter demonstrating higher intention levels than previously hypothesised. Consequently, building on Siegrist and Hartmann's (2020a) conclusion that "*France, for example, would certainly not be a good market to start with*" (p. 7), we suggest that while this may hold true for western regions of France, it does not necessarily apply to the remaining areas of the country.

RQ2 concerned attitudes towards CM and their influence on behavioural intentions. Consistent with the patterns observed for intentions, Italian and Dutch consumers in our study generally expressed more positive attitudes towards CM compared to French consumers. The inclusion of selected attitudinal attributes enabled further cross-cultural comparison with previous studies (Dupont et al., 2022; Pronk et al., 2025; Rodríguez Escobar et al., 2025). Perceived artificialness in our sample was similar to that reported by Belgian, Chilean, and German consumers. Italian respondents showed more positive perception of sensory appeal, comparable to German (Dupont et al., 2022; Pronk et al., 2025) and Serbian respondents (Pronk et al., 2025), whereas French participants reported a similar low CM innovation perception to the Belgian respondents of Rodríguez Escobar et al. (2025). Overall, our findings echo previous evidence of more positive attitudes among Chinese, German, and Dutch consumers, while also underscoring the favourable stance of Italian respondents across several attributes. CM was consistently perceived as more unnatural across countries. Notably, while this product-specific perception predicted intentions, in line with prior literature (Yu et al., 2025), the broader natural-is-better heuristic did not significantly influence CM attitudes, highlighting the importance of clearly distinguishing between these two levels of conceptualisation. This will be discussed in more detail in relation to RQ3.

Finally, it should be noted that attitudes were measured towards CM in general, whereas behavioural intentions referred to a specific product format, namely a CM burger. While the attitude-intention relationship observed in this study was already substantial, this measurement mismatch should nonetheless be considered when interpreting the results. According to the Reasoned Action Approach, attitude-intention associations tend to be stronger when both constructs are measured at the same level of specificity. It is therefore possible that aligning attitudes with a product-specific CM format could have resulted in even stronger associations. Future research should address this issue by better matching attitude and intention measures, in line with the "principle of compatibility" (Fishbein & Ajzen, 2010, p. 44), and by examining whether product-specific attitudes yield differentiated intention patterns across CM formats.

In response to RQ2, the strong positive correlations between attitudes and both WTT and WTB in our study, as well as the results of the regression analysis, highlight the significant role and predictive power of attitudes in shaping behavioural intentions. These findings are consistent with the Reasoned Action Approach (Fishbein & Ajzen, 2010) and with prior research in these countries that identified attitudes as a key determinant of intention (Castellani et al., 2025; Onwezen et al., 2019). Nonetheless, while the explained variance is already substantial, particularly among the Italian and Dutch subsamples, future studies could explore the inclusion of additional predictors of intention, such as social norms, and emotion-related measures, which have demonstrated promising explanatory power in previous research (Castellani et al., 2025; Kouarfaté et al., 2024; Onwezen et al., 2019; Stollar et al., 2022). Furthermore, improving the alignment of attitudinal and intention measures with respect to action, target, time, and context, following the Principle of Compatibility (Fishbein & Ajzen, 2010) and the initial promising evidence by Dupont et al. (2022), could serve as an additional refinement in future studies.

RQ3 explored how sociodemographic and psychological background factors, identified as relevant in previous literature, influence attitudes towards CM and, consequently, behavioural intentions. Our findings partly challenge prior research by showing that being young was the only consistent demographic predictor across all three national samples, aligning with several previous studies reporting a similar effect for age (Hanan et al., 2024; Pakseresht et al., 2022). By contrast, higher education had a significant effect only within the Italian and Dutch subsamples, corroborating earlier findings in these countries (Fantechi et al., 2025; Rolland et al., 2020), and confirming the persistent skepticism of highly educated French consumers previously noted by Hocquette et al. (2015). Gender effects also varied by country: in Italy and the Netherlands, being male was associated with more positive attitudes, contrasting the results by Coderoni et al. (2025) and Fantechi et al. (2025), although the former was based a non-representative sample and the latter instead focused the regression model on "intentions to engage" with CM rather than attitudes. Further cross-national research to clarify the role of gender and other demographic variables in shaping attitudes towards CM would be therefore advisable (Yu et al., 2025). Interestingly, the expected impact of diet was not observed: only a minor, albeit significant, effect of being vegan or vegetarian emerged within the Italian sample. This finding updates earlier studies suggesting greater openness among French meat consumers (Gousset et al., 2022) and contradicts the positive effects of dietary restrictions on acceptance reported by Demartini et al. (2024), while aligning with the skepticism of Italian omnivores noted by Fasanelli et al. (2025). However, given the smaller sample size of non-meat eaters in our national subsamples, we agree with these latter authors that more targeted research is needed to clarify how dietary habits shape attitudes towards CM. To our knowledge, only Lanz et al. (2025) has recently investigated this aspect in depth, though limited to a single national context.

Among the psychological predictors, the most salient finding was the strong and consistent influence of food technophobia and trust in food safety authorities, contrasted with the unexpectedly non-significant role of naturalness heuristics across all three countries. These results reinforce recent findings about the centrality of trust in shaping positive attitudes towards novel foods (Harrison & Liem, 2026; Macready et al., 2025; Šostar et al., 2023; Wendt & Weinrich, 2025) and underscore the potential impact of recent public discourse involving food safety authorities, as exemplified by the demonstration organized by the Italian farmers' association Coldiretti outside the EFSA headquarter, titled "Shine a light on the safety of lab-grown cell-based foods" (EFSA, 2025). This highlights the need to enhance communication strategies around CM technologies and to build public trust in food safety institutions, particularly among stakeholders most directly affected by such innovations (Moritz et al., 2023). In this regard, the stakeholders involved in the CM sector could consider the Asilomar framework approach suggested by Bottini et al. (2023) with the aim of improving safety standards, transparency and communication with the public and consumers. Moreover, future consumer research would benefit from incorporating additional dimensions of the multifaceted trust construct, as exemplified by Murphy et al. (2022), who employed disaggregated cross-cultural measures of trust in food chain actors, food organizations, food products, and general trust, based on the Trust Toolkit (Benson et al., 2020) and by Harrison and Liem (2026) on CM acceptance.

Similarly, the findings on food technology neophobia advance current literature by demonstrating that, in the context of CM as a highly technological innovation, this construct is a more robust predictor of attitudes and a more salient barrier to acceptance than general food neophobia. Given its limited integration into existing CM research, future studies should place greater emphasis on food technology neophobia, potentially examining it alongside general food neophobia to capture their distinct yet related effects (Hanan et al., 2024). While this study addressed several gaps highlighted by Wendt and Weinrich (2023) and corroborates the results of the meta-analysis conducted by Yu et al. (2025), further research is warranted to validate food technology neophobia scales in under-researched and cross-cultural contexts, thereby strengthening the generalisability of these findings.

Notably, the non-significant effect of the naturalness heuristic on attitudes contrasts with several previous studies in which it was identified as a key barrier to CM acceptance (Monaco et al., 2024; Siegrist & Hartmann, 2020b). However, our results are consistent with those of Wilks et al. (2019), who employed a comparably abstract measure of naturalness and with the recent meta review by Yu et al. (2025). Studies that reported significant effects generally assessed perceptions of how natural CM itself was considered (e.g., Herziger & Tesler, 2025; Siegrist et al., 2018), whereas the validated scale used in this study measured the broader natural-is-better heuristic without explicitly referring to CM in the items and was administered before the product was introduced in the questionnaire. Drawing on the interpretation proposed by Wilks et al. (2019) and the synthesis by Yu et al. (2025), when a predictor is conceptually more distant from the defining characteristics of CM, its influence on acceptance outcomes tends to diminish. In this sense, naturalness may act less as a stable disposition and more as a situational heuristic that becomes salient only when contextual cues are present (Tversky & Kahneman, 1974). In our study, this heuristic may therefore not have been activated until CM was cognitively and emotionally processed, with references to artificialness possibly emerging as post hoc rationalisations of intuitive reactions. Overall, our findings highlight the importance of distinguishing between general psychological predispositions and context-specific perceptions when analysing consumer responses to emerging food technologies. Finally, although a similar argument might apply to food technology neophobia, the explicit reference to novel food technologies within its validated items ensures a closer conceptual correspondence with CM, consistent with the empirical evidence provided by Yu et al. (2025).

5.1. Limitations

Some limitations should be considered when interpreting the findings of this study. First, the cross-sectional design precludes the ability to establish causal relationships between the variables examined. While this limitation is common in research on consumer acceptance of CM (Onwezen & Dagevos, 2024), future studies employing longitudinal or experimental designs are needed to better assess causality. Second, although the research design was consistent across the three countries, data collection periods varied slightly (Italy and the Netherlands: April 2023; France: March–April 2024). As a result, we cannot rule out the possibility that external events occurring during these temporal gaps may have influenced respondents' attitudes or intentions. For example, the debate following the Italian legislative proposal restricting CM, implemented in fall 2023 (Gazzetta Ufficiale della Repubblica Italiana, 2023), and a subsequent French proposal in December 2023 (Assemblée nationale, 2023), may have influenced perceptions among French consumers. Media coverage and public interest trends during this period (e.g., Google News and Google Trends) were examined and we did not identify other major events likely to have affected the results. Nevertheless, this temporal gap should be considered when interpreting this cross-national comparison. Third, while attitudes were assessed with reference to CM in general, behavioural intentions were measured in relation to a specific product (i.e. a burger), consistent with Dupont et al. (2022) and Yu et al. (2025). Greater alignment between attitudinal and behavioural measures, along with the inclusion of additional product types beyond burgers as in Herziger and Tesler (2025), would strengthen and enhance validity. Fourth, the sample was limited to individuals aged 18 to 65. Although the included age groups cover the majority of food decision-makers, future research could benefit from the inclusion of younger and older individuals to capture a more comprehensive demographic spectrum and better understand intergenerational differences in acceptance. Moreover, as with most consumer research on CM, our study was based on a hypothetical product scenario due to its scarce commercial availability which could have limited the accuracy and ecological validity of participants' responses. Finally, the potential cross-cultural differences in interpreting constructs that are more culturally sensitive, such as food technology neophobia or trust in food-safety authorities and scientists, may have affected comparability across countries.

6. Conclusions

This cross-cultural study examined consumer intentions and drivers of CM acceptance across three key European countries: Italy, France, and the Netherlands. Our findings highlight the need to move beyond national lenses and investigate regional dynamics and local specificities in consumer responses. Technophobia and distrust in food safety authorities and scientists, rather than the naturalness heuristic, food neophobia, or environmental concern, emerged as the most consistent barriers to acceptance across contexts. These results call for greater institutional and stakeholder efforts in transparent risk communication and community engagement. Building and sustaining trust in food safety authorities will be critical, particularly as regulatory frameworks for CM continue to evolve (Monaco, 2025). With the exception of France's western regions, most consumers expressed interest in tasting CM, an interesting finding given the recent market approval applications submitted by French and Dutch CM companies. Following the Dutch example (Southey, 2023), policymakers and industry actors could consider initiatives such as tasting trials or waiting lists to assess how real-world exposure affects consumer behaviour. Overall, this study updates and advances current understanding of European consumer perceptions of CM, while underscoring the pressing need for more representative research at both cross-national and subnational levels. The current scarcity of such data constitutes a critical gap and should be treated as a priority for future research.

Declaration of generative AI use

During the preparation of this work the authors used Deepl (https://www.deepl.com), Grammarly (https://www.grammarly.com) and Chat GPT V3 (https://chatgpt.com), in order to improve the language and grammar of certain parts of the text. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

CRediT authorship contribution statement

Barbara Loera: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Pericle Raverta:** Writing – review & editing, Writing – original draft, Visualization, Validation, Investigation, Formal analysis, Data curation. **Alessandro Bertero:** Writing – review & editing, Validation, Resources, Conceptualization. **Matteo Cresti:** Writing – review & editing, Validation, Resources, Conceptualization. **Simona Stano:** Writing – review & editing, Validation, Resources, Conceptualization. **Luca Lo Sapio:** Writing – review & editing, Validation, Resources, Project administration, Conceptualization.

Ethical statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Bioethics Committee of the University of Turin (Approval No. 0212054), and all participants provided informed consent prior to participation. Compensation was provided through Ipsos' standard panel reward system.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Pericle Raverta reports a relationship with The Protein

Diversification Academy that includes: board membership.

Pericle Raverta reports a relationship with Cellular Agriculture Italy that includes: membership.

Alessandro Bertero reports being the inventor of cellular agriculture patents.

PR serves voluntarily and without financial interest as Secretary-General of The Protein Diversification Academy, a non-profit association dedicated to education on alternative proteins, and as a member of Cellular Agriculture Italy, a non-profit association promoting knowledge and advancement of cellular agriculture. AB is an inventor of cellular agriculture patents. The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ifset.2026.104459.

Data availability

The data that support the findings of this study are available from the authors, upon request.

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