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Consumer acceptance of cultured meat: an in-depth qualitative assessment

Paola Castellani and Fabio Cassia
Department of Management, University of Verona, Verona, Italy
Alfonso Vargas-Sánchez
Faculty of Business Sciences and Tourism, University of Huelva, Huelva, Spain, and
Elena Giaretta
Department of Management, University of Verona, Verona, Italy

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Abstract

Purpose – This study identifies the themes that consumers associate with attitudes towards, and intentions to purchase, cultured meat. It also examines the relationships between these themes and the drivers of innovation according to the diffusion of innovations theory proposed by Rogers.

Design/methodology/approach – A qualitative approach was used to collect information from 256 participants. A specific type of content analysis, "cognitive analysis," was performed on this information using Leximancer, which supports visually oriented sense-making.

Findings – The analysis revealed a variety of themes associated with attitudes towards, and intentions to purchase, cultured meat. Moreover, the diffusion of innovations theory emerged as a valuable framework for organising these themes around the five attributes of innovation: relative advantage, compatibility, complexity, trialability and observability.

Research limitations/implications – This study examined the consumer perspective, but the acceptance and commercialisation of cultured meat will also depend on the attitudes and behaviours of several other actors (e.g. farmers), which need to be studied.

Originality/value – This study contributes to addressing several research priorities highlighted in recent literature on the consumer acceptance of cultured meat, including the need to conduct more qualitative studies and to apply the diffusion of innovations framework.

Keywords Cultured meat, Lab-grown meat, Consumer, Novel foods, Leximancer

Paper type Research article

1. Introduction

Cultured meat (or lab-grown meat) is emerging as one of the most promising opportunities among novel foods (Rasmussen *et al.*, 2024). Early research has suggested that this product may contribute to increased food production and may have fewer negative effects on land and water than traditional meat (Tuomisto and Ryynänen, 2024). Therefore, this novel food could be a valuable option to sustainably meet the food needs of the increasing global population, which is forecasted to reach 9.7 billion people by 2050 (FAO, 2023). Cultured meat is in the initial stage of its life cycle, and numerous challenges and uncertainties surround its commercialisation. Substantial investments are required to develop a marketable product, in terms of both quality (including taste) and accessible price (Choudhary *et al.*, 2024). For example, the future cost of producing cultured meat at a large-scale facility may be about US$63/kg (Garrison *et al.*, 2022), which may represent a barrier to consumer adoption.

The diffusion of cultured meat will also depend significantly on consumers' acceptance and purchase intention (Hocquette, 2016). Researchers have begun examining this issue and have

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suggested that multiple variables influence consumers, including the taste and shape of this product, as well as health and environmental considerations (Kouarfaté and Durif, 2023). However, Hanan *et al.*'s (2024) recent literature review revealed several knowledge gaps. Consequently, they indicated certain research priorities, including the need to conduct more qualitative studies and use a diffusion of the innovation framework. Hence, we address these gaps through this large-scale qualitative study on consumer attitudes by conducting thematic content analysis using the Leximancer software (Goh and Wilk, 2024). Moreover, we ground our study in the diffusion of innovations theory proposed by Rogers (2003). In detail, we address the following research questions:

RQ1. What are the themes that consumers associate with attitudes towards, and intentions to purchase, cultured meat?

RQ2. How are these themes related to the drivers of innovation proposed by the diffusion of innovations theory of Rogers?

The findings of this study contribute to both theory and practice. Regarding theory, our analysis highlights the themes and concepts (and the relationships between them) that consumers associate with cultured meat and its purchase. Moreover, by revealing the relative importance of each theme and concept, the analysis provides clear insights to practitioners and policymakers about the most urgent issues to address for consumer acceptance of this meat.

The remainder of this article is structured as follows. In Section 2, we present the background of the study by using the lens of the diffusion of innovations theory to review current knowledge about consumer attitudes towards cultured meat. In Section 3, we describe the methods we used, and in Section 4, we present the analysis results. In Sections 5 and 6, we discuss our findings and conclusions, respectively.

2. Research background

Recently, studies have begun to explore consumer attitudes and behavioural intentions towards cultured meat. In this study, we specifically examine the factors that may explain the formation of such attitudes and intentions. To organise and advance the knowledge on the topic, we adopt the diffusion of innovations theory, which Rogers introduced in 1962 and refined in 2003 (Rogers, 2003). It states that five drivers or attributes of innovations influence the rate of their adoption: relative advantage, compatibility, complexity, trialability and observability (Kapoor *et al.*, 2014). This theory has proved valuable in explaining and predicting the diffusion of food-related innovations, such as 3D food printing (Guaqueta-Garcia *et al.*, 2025), but has received limited attention in the context of cultured meat (Wang *et al.*, 2024). To date, only one study has applied it to examine the acceptance of this meat, and the use of a diffusion of innovations framework could advance the understanding of this novel product (Hanan *et al.*, 2024). In Sections 2.1 to 2.5, we introduce these five attributes and relate each to the available studies on cultured meat in order to establish the current state of knowledge and outline conceptual expectations.

2.1 Relative advantage

Relative advantage is "the degree to which an innovation is perceived as better than the idea it supersedes" and may involve economic, social or other types of advantages (Rogers, 2003, p. 229). Several studies have highlighted the perceived advantages of cultured meat over traditional meat and the associated positive influence on consumers' attitudes and intentions. In particular, some studies indicated that environmental benefits serve as positive drivers, and they emphasised decreases in greenhouse gas emissions, land and water use, and pollution (Tuomisto and Ryynänen, 2024). In addition, cultured meat offers ethical benefits by improving animal welfare and eliminating slaughter (Bryant and Barnett, 2018; Kouarfaté and Durif, 2023; Verbeke *et al.*, 2015a). Studies have also suggested that this product may be

healthier because of tighter control over the production process. However, other studies reflected concerns on this point, arguing that the long-term health effects of "artificial" meat still need to be assessed (Mancini and Antonioli, 2022; Siegrist *et al.*, 2018). Despite this knowledge, deep qualitative understanding is yet to be gained of how the perceived relative advantage shapes attitudes and purchase intentions towards cultured meat. Conceptually, we expect that the higher the perceived relative advantage, the more favourable the attitudes and the stronger the purchase intentions.

2.2 Compatibility

Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" and is thus strongly intertwined with potential adopters' values and beliefs (Rogers, 2003, p. 240). The literature has indicated that the absence of compatibility with consumers' values prevents them from accepting cultured meat. For example, their attachment to traditional meat, food neophobia, cultural food traditions, and the perception that cultured meat is less natural than traditional meat contribute to their resistance (Hoek *et al.*, 2011; Siddiqui *et al.*, 2022; Siegrist *et al.*, 2018). To a certain extent, perceived compatibility can be enhanced through appropriate communication strategies and framing, such as to deemphasise the "technological" component of cultured meat (Arango *et al.*, 2023, 2024; Baum *et al.*, 2022), suggesting that alignment with pro-environmental values enhances acceptance. Despite these findings, it is still necessary to explore in detail how consumer values (e.g. pro-environmentalism) shape attitudes and purchase intentions towards this product. Conceptually, we expect that the higher the compatibility, the more favourable the attitudes and the stronger the purchase intentions.

2.3 Complexity

Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use" and may be particularly relevant for some types of technical innovations (Rogers, 2003, p. 257). Studies have shown that potential consumers generally perceive the production process of cultured meat as too complex to understand (Verbeke *et al.*, 2015b; Wilks and Phillips, 2017). It is also challenging to predict the taste and texture of this new product (Verbeke *et al.*, 2015a). Another finding is that consumers struggle to fully anticipate the health effects of cultured meat consumption, and this uncertainty influences their attitudes and behavioural intentions (Castellani *et al.*, 2025). Nevertheless, studies are yet to examine in detail specific aspects of complexity that influence consumer attitudes and behavioural intentions. Such knowledge is fundamental to design interventions aimed at supporting the acceptance of this product. Conceptually, we expect that the higher the complexity, the less favourable the attitudes and the weaker the purchase intentions.

2.4 Trialability

Trialability is "the degree to which an innovation may be experimented with on a limited basis," thus reducing perceived uncertainty (Rogers, 2003, p. 258). Prior research suggested that curiosity is a driver of consumer interest and intention to try cultured meat (Wilks and Phillips, 2017). Exposure to information about this new product, along with the opportunity to try it, can improve attitudes and purchase intentions. The opportunity to try a new product on a limited basis reduces uncertainty and fosters adoption (Rogers, 2003). Palmieri *et al.* (2020), who showed that trial opportunities could significantly enhance attitudes towards cultured meat, found that 78.2% of the consumers they interviewed intended to try this novel food. Yet, such intentions are not homogeneous across age groups. Recent analyses have revealed a more nuanced picture, identifying distinct consumer clusters, including sceptics, moderates and optimists (Heiskanen and Ryynänen, 2024). However, this product is not yet available in the market (apart from a few exceptions, such as in Singapore), which limits its trialability.

Although the literature has provided these findings, gaining further insights into consumer curiosity about this product is essential. Similarly, little is known about trial behaviours. Conceptually, we expect that the higher the perceived trialability, the more favourable the attitudes and the stronger the purchase intentions.

2.5 Observability

Observability is "the degree to which the results of an innovation are visible to others," which refers to how easily an innovation can be observed and communicated to other people (Rogers, 2003, p. 258). Typically, the adoption of observable innovations is more widespread and rapid because of social learning and imitation mechanisms (Rogers, 2003). However, the observability of cultured meat remains extremely limited because it is not yet commercially available (apart from the aforementioned few exceptions). Early adopters are fundamental to increasing observability, and the literature has identified distinct segments with varying levels of adoption readiness: sceptics, moderates and optimists (Heiskanen and Ryynänen, 2024). Specifically, optimists could serve as early adopters. Furthermore, the way that cultured meat is presented in communication strategies can influence consumer perceptions (Arango *et al.*, 2023; Baum *et al.*, 2022). Despite these findings, little is known about the sources of information that consumers search for and trust when direct observation is not possible. Conceptually, we expect that the higher the observability, the more favourable the attitudes and the stronger the purchase intentions.

In summary, knowledge of consumer attitudes and purchase intentions towards cultured meat remains limited and fragmented. In their review of the literature on such meat, Hanan *et al.* (2024) identified only 54 published studies of which only one used qualitative methods. Moreover, they emphasised that qualitative research is necessary to provide a novel understanding of the complex network of factors influencing the acceptance of this product.

3. Method

We used a qualitative research design and conducted a content analysis on information collected from 256 Italian consumers. To recruit participants, we shared a link to an online form, hosted on SurveyMonkey®, through our personal networks. Participants were also invited to share this link with their contacts. Such a snowball sampling method "is a useful methodology in exploratory, qualitative and descriptive research" and enables researchers to reach a diverse sample of participants (Baltar and Brunet, 2012, p. 60). However, caution must be exercised in generalising the results derived on using this approach, and the findings cannot be considered representative of the entire population of Italian consumers. This approach yielded a group of respondents who varied in terms of age, gender, education and occupation, which contributed to gaining a rich understanding of perspectives on cultured meat (Table 1).

In the online form, we provided a brief introduction to this study and to cultured meat, using the official definition of this novel food provided by the European Union (2018). Then, we asked participants the following open questions on their attitude towards, and intention to purchase, this food: (1) In general, what is your attitude regarding cultured meat? (2) If it were available in supermarkets, restaurants, etc., would you buy it? Why?

We translated their responses from Italian to English and analysed these using the Leximancer software (Smith and Humphreys, 2006). We took care to preserve the semantic meaning of responses throughout this process and applied a back-translation procedure to ensure the accuracy of the translated text. We selected Leximancer as the analytical tool because it enables the analysis of large volumes of qualitative text while reducing researchers' subjective bias through its automated, data-driven approach that identifies themes and concepts (Smith and Humphreys, 2006). In particular, Leximancer (2021) aims to "let the data generate a transparent model which can be interpreted by the analyst so that this person may efficiently conduct a sense-making examination of conceivably vast amounts of text." Moreover, prior food-related studies have used this tool (Bigi *et al.*, 2022).

Table 1. Sample profile

Variable	Frequency ($N = 256$)
Gender	
Female	195
Male	56
Prefer not to answer	5
Age (years)	
<20	9
20–29	33
30–39	24
40–49	59
50–59	70
60–69	44
70+	17
Education	
Middle or high school diploma	93
Bachelor's and/or master's degree	119
Postgraduate degree	44
Occupation	
Employee	73
Teacher/Professor	37
Self-employed	32
Student	24
Entrepreneur	6
Unemployed	6
Other	78

Source(s): Authors' own work

To obtain more detailed findings, we analysed the answers to the aforementioned two questions separately. Leximancer supports a specific type of automatic content analysis, termed "cognitive analysis," which enables visually oriented sense-making. That is, its algorithm analyses the co-occurrences of words within each unit of analysis or text segment (we used the default setting of two sentences as the unit of analysis). Through this procedure, the tool provides a visual output consisting of themes (i.e. the circles in the output figures). Moreover, each theme can be viewed as a cluster of concepts (i.e. the words contained in the circles) (Goh and Wilk, 2024). Then, the theme can be interpreted by inspecting the concepts associated with it and the corresponding quotations. We acknowledge the limitations arising from Leximancer's reliance on co-occurrence patterns rather than semantic meaning. Hence, we strived to ensure that the themes reflected participants' intended meaning. Specifically, the entire research team systematically reviewed the original quotations and discussed each theme in detail.

4. Results

4.1 Attitudes towards cultured meat

The analysis revealed eight themes in participants' attitudes towards cultured meat (Figure 1). Overall, they expressed both positive and negative general attitudes for several reasons. Next, we examine each theme in detail.

4.1.1 Cultured [meat]. Several responses revealed a positive attitude towards cultivated meat. Namely, respondents considered it a viable alternative to traditional meat and an appropriate solution for addressing global nutritional needs more sustainably, changing their

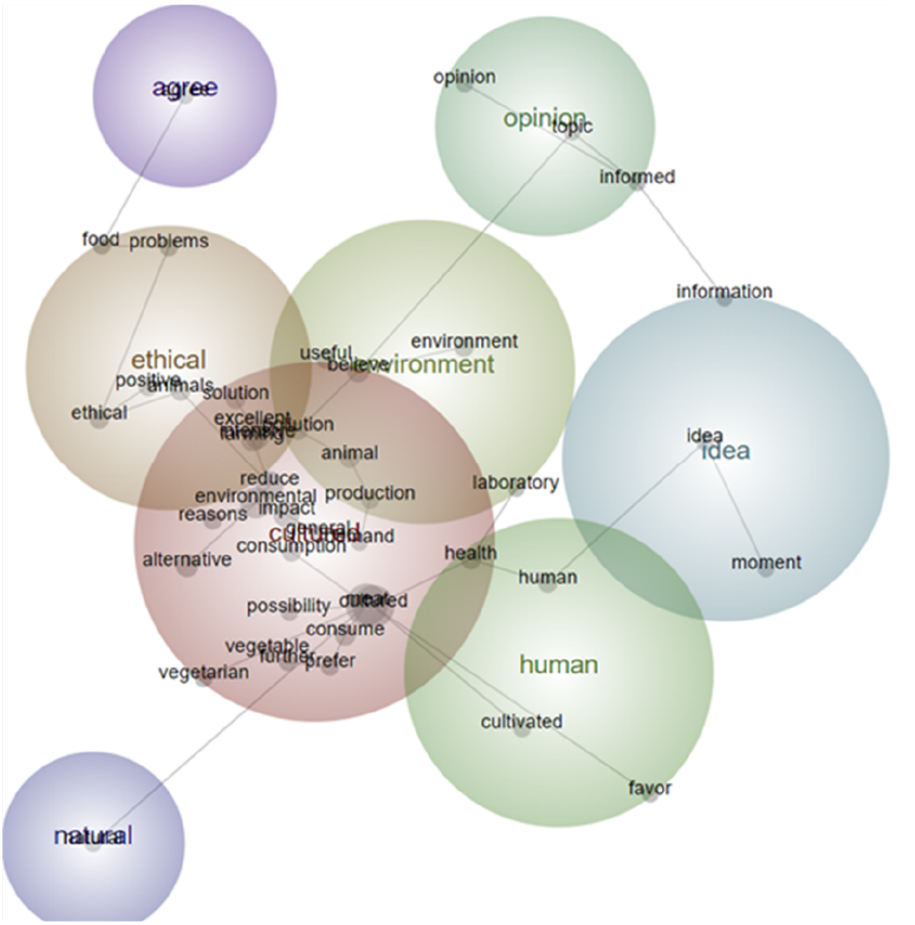

Figure 1. Attitudes towards cultured meat: map of themes and concepts. **Source**: Authors' own work

habits for a better quality of life, and improving social and environmental conditions, which would help to safeguard the planet's resources for future generations:

> It is the only way to consume meat sustainably. It also saves the lives of animals.
>
> A smart choice for the environment, animals and health; I am vegan.
>
> I am in favour of an important change like this. Now more than ever, there is a need to evolve our habits for better well-being from a social and environmental point of view, not only for us but, above all, for future generations.
>
> I hope humanity understands that we need to change regardless of our opinions or beliefs.

Some respondents stated that cultivated meat, which undergoes strict quality control processes during production, would be a safer product than traditional meat, which is subject to variability factors related to nature and the animal's growth process:

> I think that the production of cultured meat allows us to better control the "quality" of the meat, understood as the possibility of controlling the parameters that allow us to have the meat of a certain type compared to the variability that is inevitably generated in an individual animal.

However, certain respondents expressed doubts about cultivated meat, while others disclosed a preference for alternatives such as vegan and vegetarian diets:

> I'm a vegetarian, and there are already many alternatives to meat. This is why I am very dubious about using cultured meat.

> I am very much in favour of eating cultured meat. I believe Italy is missing another opportunity to prioritise the environment and the health of its citizens. According to the "One Health" model, human health cannot be sustained without proper care of environmental health. At the same time, I would not consume cultured meat, because I am a vegetarian, driven by both environmental and health concerns. On the one hand, to further limit my environmental impact, I prefer to choose predominantly vegetable protein sources, and on the other hand, I do not consume meat in general to reduce the risk of developing non-communicable diseases (hypertension, hypercholesterolemia, diabetes . . .) and colon cancer directly.

Some responses revealed negative attitudes; for instance:

> I don't agree at all, I'm not ready for this type of change yet, I don't think it's relevant to me, absolutely prohibited, I will never eat it, I don't agree.

4.1.2 Idea. Some respondents asserted that cultivated meat is an innovative product. They considered it a potentially interesting, useful resource that does not affect individuals' nutritional intake and also helps to reduce negative effects on the environment and animals. They viewed it as a resource that would help the planet and the future global population, and as a means of reducing the consumption of traditional meat:

> It could be a useful novelty.

> It could be useful, but I don't know what repercussions it will have on humans and the environment.

> It's a good idea, but it must be regulated and produced using only renewable energy.

> Useful for the environment, compassionate towards animals, supportive because it will perhaps allow many more people to access a source of protein.

> I think it is a developable and far-sighted idea, especially to help our planet.

4.1.3 Human. The responses revealed that attitudes and doubts related to cultivated meat were influenced by participants' concerns for their own health and the health of their families, as well as by their level of awareness about the potential effects on health and the risks associated with its consumption. Thus, the nature and intensity of perceptions about the effects and risks of cultivated meat are crucial in shaping consumer purchasing decisions. As some respondents stated:

> There are no studies that test its impact on human health.

> I believe it is a necessary step, but not knowing the topic in depth, I also have some reservations about its consumption and possible damage to health.

> For correct management, we should start with an experiment on the impact that this meat has on the human body in the same way as drugs. Sometimes substances were introduced too easily and quickly, which later turned out to be harmful.

> My opinion on cultured meat is positive if it does not pose any health risks.

4.1.4 Environment. The attitude of many respondents towards cultivated meat was linked to their positive perceptions of its potential environmental effects and the risks associated with its production and consumption. In particular, some of them expressed strong concern about

mitigating the negative effects of the meat industry, such as pollution, deforestation to create pastures, and the exploitation and mistreatment of animals. Accordingly, several respondents expressed a positive attitude towards cultivated meat for they believed that its production has a lower environmental impact than traditional meat production:

> Every alternative to the consumption of conventional meat should be favoured to reduce the environmental impact of livestock farming.
>
> Positive, useful for reducing environmental problems, reducing animal exploitation and avoiding deforestation for pastures.
>
> I believe that cultured meat can be a great tool to reduce pollution from the meat industry, reduce animal exploitation and increase food availability for all. If animals were raised solely for derivatives such as milk and eggs, rather than for meat, the number of livestock needed would be significantly reduced, as would the pollution they generate and the land they consume. This land could then be used to grow crops, providing more food for everyone.

The positive attitude towards cultivated meat would be strengthened if it were unequivocally confirmed that the use of this innovative product is not harmful to humans, as one respondent explained:

> If proven not harmful, it would be a fundamental turning point for the environment!.

4.1.5 Ethical. Some respondents also reflected on the ethical implications of producing and consuming cultivated meat. They asserted that it is an excellent alternative to traditional meat for it helps reduce the adverse environmental and ethical effects of the meat industry. The consumption of cultivated meat was considered an ethical choice, particularly by those who had not been consuming meat for a long time:

> Indispensable from an ethical and nutritional point of view.
>
> Excellent alternative to reduce the environmental and ethical impacts of the agro-livestock supply chain.

4.1.6 Opinion. Each respondent's opinions were influenced by the body of knowledge that they believed they possessed. In general, the responses highlighted that many respondents perceived that they.

(1) Had limited knowledge of the topic,

(2) Had limited or no access to reliable information sources,

(3) Needed adequate information on the effects of cultivated meat,

(4) Desired greater understanding about this product.

Several respondents stated that they did not have sufficient knowledge about cultivated meat or the effects of its production and consumption to form and express a well-informed opinion:

> I don't know enough to offer an opinion.
>
> It may be an alternative to eating meat, but I don't know enough about it to say whether it will be very good or not.
>
> I think it's a good idea to reduce animal exploitation, but I don't know what its environmental impact could be.
>
> I'm not informed enough on the topic to have a well-defined thought, but I'm still curious to see where this innovation will lead and what consequences it may have.

> It is necessary to delve deeper into the advantages and disadvantages of both consumption and production.

Some stated that the occasions to exchange knowledge on this topic are rare or even absent:

> We still don't talk about it enough.

Others highlighted the need for accurate information about the product in order to prevent the formation of biases:

> I think the studies being done are interesting and important. We must now break down certain prejudices we have and help provide correct information on cultured meat.

Furthermore, their replies revealed respondents' desire to increase their knowledge:

> I would like to know more.

In general, inadequate information or the lack of information, or the perception of such a lack by potential consumers, makes it difficult for them to form a clear opinion and make an informed choice. Simultaneously, it leaves room for increasing doubts, uncertainties and various concerns:

> I'm not informed. I fear it will prove to be a great economic opportunity for a few and that great problems of food, economic and social control will arise for a huge mass of the population.

4.1.7 Agree. Some respondents had a very positive attitude towards cultured meat. For instance:

> I have no prejudices, I would be ready to taste it and, if [it is] to my taste, [I would] consume it.

4.1.8 Natural. Our analysis revealed that several respondents did not view cultivated meat as a natural, genuine food, for it is produced in a laboratory. They also regarded it as a product subjected to manipulation processes with the intent of achieving environmental, social and economic benefits, which they believed would be better achieved through production and consumption choices that respect natural rhythms and cycles:

> I think it's against nature.
>
> It's unnatural.
>
> Not being a natural product, it could pose risks to human health.
>
> I don't like meat much. The cultivated one absolutely not. The body needs healthy, genuine, simple foods. We were designed to use what is natural.
>
> I believe that food manipulation is not always positive. I believe that to help the environment, it would be enough to eat less in general; eliminate intensive farming and let the animals grow freely and feed themselves as they should, so as to have less meat (white and red) but more substantial meat; and drastically reduce all production of those products that are not really useful for nutrition, such as snacks, for example, or snacks in general.
>
> Not positive. I don't like the fact that something is created in a lab and isn't "natural." I don't even like that they will take away jobs from millions and millions of people with families and children.

4.2 Intention to buy cultured meat

Through this analysis, we identified six themes related to participants' intention to buy cultured meat (Figure 2). Some of these themes (e.g. "cultured") are similar to those we found

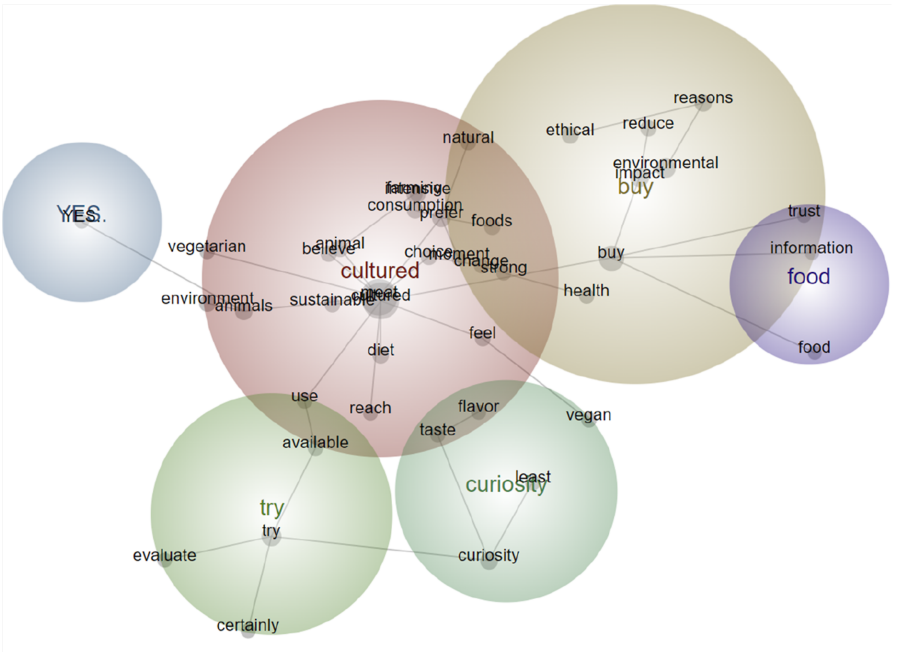

Figure 2. Intention to purchase cultured meat: map of themes and concepts. **Source**: Authors' own work

regarding attitudes. As these themes have already been discussed in Section 4.1, we will not discuss these in this section. Next, we focus on the distinctive themes that emerged with reference to the intention to buy such meat: "buy," "try" and "curiosity."

4.2.1 Buy. In this section, we discuss respondents' views about buying or not buying cultured meat, as well as the views of those who were undecided.

(1) Intention to buy

Many respondents expressed that they are fully in favour of purchasing cultured meat because they believe it meets ethical and sustainability requirements and does not pose a health risk. According to them, it meets the requirement of greater environmental sustainability, unlike conventional meat, given the lower negative effects of cultured meat on the environment at the production level (lower water consumption, impact of intensive farming, carbon dioxide emissions and methane dispersion than conventional meat production). Further, since animals are not killed to produce cultured meat, it is a cruelty-free product. It is also an alternative to a vegetarian diet and guarantees the necessary protein requirement:

> Yes, for ethical reasons, both towards animals and ecological reasons. I believe it is a good compromise for those who do not switch to vegetarianism to eat meat without contributing to intensive farming, which is evil from every point of view (ethics, environment).
>
> I would buy it because it is a good practice to improve the climate and environmental impact.
>
> I would buy it as my first choice compared to conventional meat because, from a simple purchase, I would become an accomplice to a strong change, for the environment, and also because I would contribute to reducing intensive animal farming.
>
> Certainly, to help the environment by limiting water consumption and the dispersion of methane into the environment.

I would buy it because no animals would be killed.

Of course, also because I expect the absence of health risks to be demonstrated or at least that there are no further ones, since already in conditions of equal impact [of traditional and cultivated meat] on health, an environmental problem would be solved.

I'm vegetarian; if it were available, I would definitely buy it. However, I don't buy the traditional one.

I might consider abandoning the vegetarian diet and going back to eating meat if farmed.

Other respondents' intention to purchase cultivated meat was contingent upon specific conditions, such as an appreciable level of quality, proof of its safety, its market availability and a lower purchase price. The decrease in market price would increase the consumption of cultured meat, effectively making it a viable alternative to conventional meat. Some respondents stated:

Yes, hoping that the quality is appreciable.

I already don't use foods of animal origin, but if cultured meat were available on the market, I might consider it since there is no suffering behind it.

If I were to host a dinner for people with omnivorous diets and were presented with the choice between meat and cultured meat, I would choose cultured meat. I am aware that European legislation regarding food safety is among the best in the world. If I found it on the market, I would know that it is a safe food product.

I believe that it must also be economically accessible to people, as this aspect would certainly encourage consumption and, in this way, it would truly represent an alternative to current meat production.

(2) Intention not to buy

Some respondents firmly expressed their intention not to buy cultured meat. They were not attracted to this product for various reasons: they considered it a manipulated food and therefore did not trust it, they believed it is unhealthy and they also preferred to consume natural foods (considered healthier). Some said they preferred conventional meat, and, in particular, evaluated its supply from trusted suppliers; others expressed a preference for a vegetarian or vegan diet, or, in any case, a desire to reduce their meat consumption owing to concerns about its potential negative health effects.

Some participants' decision not to purchase cultured meat was also attributable to a lack of adequate information on this product, unclear information on its pros and cons, and a lack of information on potential risks. Some reported that they will not consider buying it until they receive feedback from consumers, as they are unsure of their experience:

I wouldn't buy it because of the distrust I have in "manipulated" foods.

No, I prefer foods that are as simple and natural as possible; I consider them healthier.

I'd rather go vegan. I'm already on the right track, so it would be a good incentive to reach the vegan goal, which I consider the closest to my thoughts and feelings.

No, I eat very little meat now, and I don't feel sure that it doesn't have harmful effects on my health.

I wouldn't buy it, because I'm not informed enough about the pros and cons. I wouldn't trust it.

I would wait for other people's feedback.

Today I say no. Once informed of all the risks involved, I would evaluate.

(3) Undefined intentions: buy or not buy?

Some respondents answered that they had not yet formed an opinion on the choice between buying and not buying cultured meat. Although some were curious, overall, they reported not

being convinced and not having a clear idea about it. They also stated that they need to deepen their knowledge about it and that market proposals could be a useful but not decisive element in their evaluations:

> I don't know. I should know more.
>
> Maybe out of curiosity, but I'm not sure.
>
> It depends on the price.
>
> I don't know. I should ask people who have adequate expertise on the subject. The market proposals are not enough to change my choices.

4.2.2 Try. Several respondents expressed their interest in cultured meat and their intention to try the product when it becomes available in the market, to evaluate its taste and compare it with traditional meat, and to experience a more respectful relationship with nature. For some, the desire to try the product would be subject to their prior collection of adequate information that supports their choice:

> I would like to try.
>
> I would try it to evaluate a more symbiotic relationship with the environment and animals.
>
> I think I would give it a try, but first, I would look for reliable information on which to base my possible choice.
>
> Yes, even if just to try the flavour.
>
> Yes, because I don't eat traditional meat.
>
> I've never tried it, but certainly, if it were available, I would give it a try, at least to evaluate the difference compared to the non-cultivated one.

4.2.3 Curiosity. The intention to purchase cultured meat was supported by a strong curiosity about this new product, which respondents found attractive. Their curiosity would drive them to experiment and learn about this product, to evaluate its quality and to potentially adjust their diet if the test results are positive. Further, their curiosity led them to collect information about the new product, including its characteristics and sustainability, even if they had chosen a vegetarian diet or, at the very least, reduced their meat consumption.

As curious people, they tended to show an openness to change that can significantly support the spread of innovations, which can be considered positive, and the development of awareness about the effects and opportunities resulting from such innovations:

> First of all, out of pure curiosity, if it turns out to be organoleptically pleasant, it could become part of the usual diet.
>
> Yes, certainly. I'm already buying less meat and more plant-based alternatives, but I'm curious to try cultured meat.
>
> I would buy it above all out of curiosity: to see if the taste, flavour, and texture are like those of "classic" meat. Secondly, for reasons related to environmental impact.
>
> Yes, out of curiosity and to contribute to a cruelty-free world.

5. Discussion

The results presented in Section 4 provide a clear answer to RQ1, which aimed to assess the themes that consumers associate with attitudes towards, and intentions to purchase, cultured meat, and to RQ2, which aimed to understand how the themes identified through the content

analysis relate to the drivers of innovation proposed by the diffusions of innovations theory (Rogers, 2003). In this section, we discuss our findings in depth, highlighting the complex connections between the attributes of this theory and the themes that explicitly emerged from the analysis. First, we discuss the findings about attitudes towards cultured meat. Then, we discuss those related to the intention to purchase this product.

In relation to the attitude towards cultured meat, our findings reflect four attributes outlined by Rogers regarding innovations (Table 2). The attribute "relative advantage" includes the

Table 2. Attitude towards cultured meat: connections between attributes of the diffusion of innovations theory (Rogers, 2003), and the themes and concepts identified in this study

Attributes of rogers' theory	Themes	Concepts from respondents' quotations
Relative advantage	*Cultured meat*	Environmental impact
		Social impact
		Health impact
		Ethical impact
		Improved well-being
		High quality control in production processes
	Idea	A developable, far-sighted idea to help the planet
		A useful resource for the environment, animals and people
	Environment	Reduce the environmental impact
		Reduce animal exploitation
		Reduce pollution from the meat industry
		Avoid deforestation for pastures
	Ethical	Alternative to reduce the environmental and ethical effects of the agro-livestock supply chain
Compatibility	*Cultured meat*	Pro-environmentalism
		Care of human health
		Care of animals
	Idea	A useful novelty for sustainable development
		A useful resource to reduce meat consumption
	Ethical	Ethical choice
	Opinion	Need to talk about it
	Natural	Believe in the value of natural foods
		Need for healthy and genuine foods
		Against manipulated food
Complexity	*Cultured meat*	Doubts about consuming cultured meat
		Preference for plant-based products
		Intention to reduce the risk of developing non-communicable diseases and cancer
	Idea	Lack of information on the repercussions to humans and the environment
	Human	Lack of empirical studies on the impact on human health
		Reservations about possible damage to health
	Opinion	Poor information
		Lack of information on environmental impact
		Lack of information on the advantages and disadvantages of consumption and production
		Need for correct and adequate information
		Break down prejudice
		Informed choice
Trialability	*Human*	Need for experiments on the impact on the human body
	Environment	Need for experiments to prove whether cultured meat is harmful to the environment
	Opinion	Need for experimentation to be informed
	Agree	Need for taste

Source(s): Authors' own work

multiple benefits associated with the producing and consuming such meat as against traditional meat. This attribute is well represented by the theme "cultured," which includes the concept of "impact," highlighting the environmental, social, health, ethical and well-being effects. Then, the theme "environment" encompasses concepts such as "reduce" and "avoid" in relation to minimising or preventing negative effects on the environment and animals. Other themes include "idea," linked to the concept of "useful" to highlight the perception of cultured meat as a resource for the environment, animals and people, and "ethical," connected to the concept of "reducing" the negative impact on the agricultural and livestock supply chain.

In addition, the attribute "compatibility" emerges from the findings regarding themes such as "cultured," "natural" and "opinion," which unfold across various concepts, including the "need" to have genuine and healthy foods and to discuss and better understand the cultured meat product, and also the concepts of "sustainable" and "care" for economic development and human, environmental and animal health.

Overall, it appears that the compatibility between cultured meat and participants' values and beliefs played a significant role in shaping their attitudes. The attribute "complexity" seems related not to the product *per se* but to its consequences for the health of the participants and the environment. Several themes, such as "human," "opinion" and "idea" and the concepts they include, suggest that cultured meat is a complex product to evaluate. In other words, given the limited information and empirical studies on its environmental and human effects, it is challenging to evaluate this product and to understand its effects on consumers' health and the risks involved in consuming it. Therefore, participants found it difficult to develop their own opinions. This attribute may hinder the acceptance of this novel food. Regarding the "trialability" attribute, the themes "human," "environment," "opinion" and "agree" emerged and are closely connected to the concept of "need," that is, the need to scientifically verify whether cultured meat is harmful or has negative consequences. Such verification is important to increase the information available on this product.

Thus, our analysis highlighted that the most frequent themes among the innovation attributes outlined by Rogers are "cultured," "idea" and "opinion."

In relation to the intention to purchase cultured meat, our findings reflect the five attributes of innovation outlined by Rogers, and the common theme appears to be "intention to buy" (Table 3). The "relative advantage" attribute is closely linked to the "intention to buy" theme. The interest and willingness to purchase cultured meat are linked to the goal of reducing the numerous negative effects of traditional meat production in favour of more sustainable development.

Regarding the "compatibility" attribute, in addition to the "intention to buy" theme (accessible, alternative and quality food), the "intention not to buy" theme emerges, linked to a preference for natural, unprocessed foods, which tend to be considered healthier. The "complexity" attribute is represented by the "intention not to buy" theme, which includes the concepts of "uncertainty," "mistrust" and "limited information" on the pros and cons of consuming cultured meat and the potential risks associated with it. It is also represented by the "undefined intention: buy or not buy" theme, which highlights the concept of "need" for greater knowledge and expertise on the topic.

Moreover, "trialability" is another innovation attribute well represented in the findings, as indicated by themes such as "intention to buy," "try" and "curiosity." The intention to purchase cultured meat is likely to strengthen if it is demonstrated to have no negative health impact and to contribute to a cruelty-free world. The incentive to at least try the product is supported by the desire to verify how it differs from traditional meat, including in flavour, and to gather reliable information for making an informed consumer choice. Then, the curious consumer tends to approach the product with a positive attitude to determine whether the taste is pleasant and whether it can become part of their diet. In other words, the possibility of trying cultured meat on a limited basis seems to be a relevant driver of its acceptance.

Last, the "observability" attribute is related to the theme "intention to buy," which includes the concept of "availability in the market." This concept emphasises that the possibility of

Table 3. Intention to purchase cultured meat: connections between attributes of the diffusion of innovations theory (Rogers, 2003), and the themes and concepts identified in this study

Attributes of rogers' theory	Themes	Concepts from respondents' quotations
Relative advantage	*Intention to buy*	For ethical reasons
		To improve the climate and reduce environmental impact
		To reduce intensive animal farming
		To accomplish a strong change
		To limit water consumption
		To limit methane dispersion into the environment
		No animals killed
Compatibility	*Intention to buy*	Alternative food
		Economically accessible
		Trust in legislation about food safety
		Food of appreciable quality
	Intention not to buy	Distrust of manipulated foods
		Preference for simple and natural food
		Belief that natural food is healthier
		To be vegan
Complexity	*Intention not to buy*	Uncertainty about the harmful effects on health
		Limited information about the pros and cons
		Lack of trust
		Waiting for other people's feedback
		Evaluation is subject to adequate information on the risks involved
	Undefined intention: buy or not buy	Need for more knowledge
		It depends on the price
		Need for adequate expertise on the topic
Trialability	*Intention to buy*	If the absence of health risks is demonstrated
		Contribute to a cruelty-free world
	Try	Try to evaluate the relationship between the environment and animals
		Try to look for reliable information for any choice
		Try the flavour
		Try to understand the difference from traditional meat
	Curiosity	Curious to understand whether the product is organically pleasant
		Try to see whether it can become part of the usual diet
		Curiosity about taste, flavour and texture
Observability	*Intention to buy*	Availability on the market

Source(s): Authors' own work

observing the innovation and its early adopters is fundamental for its future diffusion. However, the degree of observability of cultured meat is necessarily limited (since it is not yet in its commercialisation stage), which makes it difficult for potential consumers to form an attitude towards it.

6. Concluding remarks

This study provides an in-depth empirical illustration of how the attributes of the diffusion of innovations theory proposed by Rogers (2003) manifest in the specific context of the acceptance of cultured meat. In doing so, it addresses key knowledge gaps identified by Hanan *et al.* (2024). In particular, they noted that only a small number of studies on consumer acceptance of such meat have drawn on theories, which is a significant limitation in developing a systematic corpus of knowledge. Our analysis helps in filling this gap. This study offers several contributions, which we discuss next.

First, our study showed that in the cultured meat context, complexity is not related to the perceived difficulty in understanding or using the innovation (which is Rogers' original conceptualisation). Instead, complexity arises from consumer uncertainty about the unknown long-term health and environmental consequences of consuming it. Moreover, our analysis revealed differences in attribute richness. Relative advantage and compatibility emerged as the attributes with the richest thematic associations, while observability had limited relevance. This finding appears to be related to the fact that this innovation is at the pre-commercial stage.

Next, our analysis also provides managerial implications for the cultured meat and alternative protein sector. The literature has underscored the importance of designing effective communication and promotion strategies to foster the acceptance of novel foods (Mancini and Antonioli, 2022). Our study provides relevant insights on this point by uncovering the themes that consumers perceive as the most important. By incorporating those themes into communication and promotion strategies, policymakers and practitioners will be more likely to influence consumer attitudes and behaviours.

Nevertheless, this study has several limitations, which should be considered when interpreting its findings. First, our analysis reflects the view of a sample of Italian participants. Snowball sampling may have introduced self-selection bias, potentially overrepresenting individuals with a stronger interest in the topic of novel food and cultured meat. Hence, future research should use alternative sampling methods to validate our findings and enhance their generalisability. Second, since attitudes towards this product vary across countries, more studies from different contexts are needed to support our results. Third, the qualitative method we used yielded valuable insights, which allowed us to identify relevant themes. However, quantitative analyses may be useful to calculate the actual importance of different themes and innovation attributes. In addition, triangulation with quantitative data or other qualitative methods (e.g. in-depth interviews) could strengthen our findings. Last, we examined the consumer's perspective, but the future acceptance and commercialisation of cultured meat will depend on the attitudes and behaviours of several other actors, such as farmers (Räty *et al.*, 2023). Accordingly, future studies could use qualitative methods to gain a deeper understanding of the perspectives of all relevant actors and combine these in a more nuanced network perspective of the acceptance and diffusion of this novel food.

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Corresponding author
Paola Castellani can be contacted at: paola.castellani@univr.it