Analyzing consumer preferences and willingness-to-pay for cell-cultured beef: the impact of social media, subjective and objective knowledge, and political polarization among Canadian participants.

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Abstract (EN)

Traditional livestock production has gained considerable attention for its environmental impact, particularly its land use and greenhouse gas production. Cell cultured meat, or meat produced in a lab from animal stem cells, has been proposed as a solution to meet consumer demand for meat products while reducing the environmental impacts of agricultural production. Past work shows that consumers are reluctant to choose cell cultured meat. A major driver of public skepticism towards novel foods may be distrust in messaging surrounding these products. We predict this sentiment towards cell cultured meat may be exacerbated by the proliferation of disinformation and social media use, resulting in high levels of mistrust of new food technologies. In this paper, we seek to understand how media bias, political polarization, and social media use influence consumers' willingness to consume cultured meat. In a hypothetical choice experiment, Canadian participants were offered ground beef options. Participants were initially shown one of four information treatments comparing conventional, organic, and cultured meat: information highlighting the taste of meat, the process of meat production, animal welfare, or the environmental impact. A mixed-logit model predicts that, compared to conventional ground beef, consumers are willing to pay $1.15/lb less for cell cultured ground beef and $0.59/lb more for organic ground beef. However, the type of information participants received has no effect on WTP, apart from participants with high food technology neophobia, which showed a lower WTP for cell cultured meat when presented with information about the production process. Additionally, participants that are men and use social media as a main news source are more likely to choose the cell cultured ground beef over conventional ground beef. Additionally, trusting news from more news sources, high objective knowledge, and low subjective knowledge are associated with higher probability of choosing cell cultured ground beef over conventional ground beef. These results imply that mistrust of established media may contribute to the rejection of cell cultured meat. These findings point to a larger societal phenomenon of general mistrust in authority and present a potential challenge for future advertisers in seeking public trust and acceptance of this novel product.

Key words: Consumer preferences, cell cultured beef, willingness-to-pay, media bias and reliability, subjective and objective knowledge, trust in government institutions and media, media polarization, discrete choice analysis, Canadian participants.

Abstract (FR)

La production animale traditionnelle a attiré beaucoup d'attention en raison de son impact environnemental, en particulier son utilisation des terres et sa production de gaz à effet de serre. La viande cultivée en cellules, ou la viande produite en laboratoire à partir de cellules souches animales, a été proposée comme solution pour répondre à la demande des consommateurs de produits de viande tout en réduisant les impacts environnementaux de la production agricole. Des travaux antérieurs montrent que les consommateurs sont réticents à choisir de la viande cultivée en cellules. L'un des principaux moteurs du scepticisme du public à l'égard des aliments nouveaux peut être la méfiance à l'égard des messages entourant ces produits. Nous prédisons que ce sentiment à l'égard de la viande de culture cellulaire pourrait être exacerbé par la prolifération de la désinformation et de l'utilisation des médias sociaux, ce qui entraînerait des niveaux élevés de méfiance à l'égard des nouvelles technologies alimentaires. Dans cet article, nous cherchons à comprendre comment les préjugés des médias, la polarisation politique et l'utilisation des médias sociaux influencent la volonté des consommateurs à consommer de la viande cultivée. Dans le cas d'une expérience de choix hypothétique, les participants canadiens se sont vu offrir des options de bœuf haché. On a d'abord montré aux participants l'un des quatre traitements d'information comparant la viande conventionnelle, biologique et cultivée : de l'information mettant en évidence le goût de la viande, le processus de production de la viande, les considérations éthiques ou l'impact environnemental. Un modèle à logit mixte prévoit que, comparativement au bœuf haché conventionnel, les consommateurs sont prêts à payer 1,15 $/lb de moins pour le bœuf haché de culture cellulaire et 0,59 $/lb de plus pour le bœuf haché biologique. Cependant, le type d'information que les participants ont reçu n'a aucun effet sur la volonté de payer, à l'exception des participants atteints d'un niveau élevé de néophobie de la technologie alimentaire, qui ont montré une moindre volonté de payer pour la viande cultivée en cellules lorsqu'on leur présentait des informations sur le processus de production. De plus, les participants qui sont des hommes et qui utilisent les médias sociaux comme principale source d'information sont plus susceptibles de choisir le bœuf haché de culture cellulaire plutôt que le bœuf haché conventionnel. De plus, le fait de faire confiance aux informations provenant d'un plus grand nombre de sources, de connaissances objectives élevées et de faibles connaissances subjectives est associé à une probabilité plus élevée de choisir du bœuf haché de culture cellulaire plutôt que du bœuf haché conventionnel. Ces résultats impliquent que la méfiance à

l'égard des milieux établis peut contribuer au rejet de la viande de culture cellulaire. Ces résultats indiquent un phénomène sociétal plus large de méfiance générale à l'égard de l'autorité et présentent un défi potentiel pour les futurs annonceurs dans la recherche de la confiance du public et de l'acceptation de ce nouveau produit.

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Contribution of Authors

Pierre Soudry designed and coded the survey on LimeSurvey, cleaned the dataset and estimated the models using Stata, translated the survey and abstract in French, and wrote and edited all chapters of this thesis. The supervisor of this research, Dr. Mary Doidge, helped in refining the research questions and methodology, released the survey on Amazon MTurk, designed the questions for the survey alongside Pierre, and edited and provided feedback for each chapter of the thesis. Her primary contribution to the thesis materials was designing the choice sets in N-gene.

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1 Introduction and Literature Review

1.1 Concerns with Traditional Meat

In recent times, traditional meat has gained considerable attention in media and politics for its detrimental impact on the environment, and well as concerns about health, animal welfare, and the spread of zoonotic diseases (Micha, Michas, & Mozaffarian, 2012). For instance, the United Nations 26th Climate Change Conference (COP 26) acknowledged animal agriculture's contribution to climate change, noting how nitrous oxide emissions from fertilizers and manure, and methane produced by ruminant animals have high global warming potential (United Nations Climate Change, 2021). Globally it is one of the largest sources of greenhouse gases and one of the leading causal factors in the loss of biodiversity as well as water pollution, air pollution, land degradation, and global climate change (Godfray et al., 2018; Machovina, Feeley, & Ripple, 2015; Steinfeld et al., 2006; Tschofen, Azevedo, & Muller, 2019). Additionally, Canada's action on climate change acknowledges that 10% of Canada's greenhouse gas (GHG) emissions are from crop and livestock production (Government of Canada, 2020). In the United States, President Biden's climate change initiative includes plans to decarbonize the food and agricultural sector to help achieve a 100% clean energy economy and net-zero emissions no later than 2050 (Biden Plan, 2019). While not the main contributor to North American GHG emissions, reducing emissions from agriculture may help these countries in achieving their climate goals. With a growing global population that is expected to reach 10 billion by 2050, and an increasing demand for meat driven largely by income and population growth, drastic change and innovation in how we feed the population, especially when it comes to animal agriculture, is needed to reduce GHG emissions (OECD/FAO, 2021).

In addition to the carbon emissions generated from animal agriculture, the irrigation of feed crops for cattle alone accounts for nearly 8% of global human water use (Bhat, Bhat, & Kumar, 2020). Further, producing these feed crops risks contaminating water with pesticides, and soil with heavy metals, and an oversupply of nitrogen and phosphorous from fertilizers (Bhat et al., 2020). There are also concerns about animal agriculture's impact on wildlife populations, as animal farming uses a large amount of land, which contributes to biodiversity loss (Machovina et al., 2015). For instance, Godfray et al. (2018) estimate animal farming is

responsible for more than 85% of Amazonian deforestation. Similarly, the population densities of wild animals on agricultural land are generally lower than those in forests. Additionally, Gaston, Blackburn, and Goldewijk (2003) find typical bird densities per square kilometer are 300 in croplands, 375 in pasture, 800 in conifer forests, and 2,500 in tropical forests, suggesting animal farming drastically decreases bird populations.

In addition to the environmental concerns with industrial meat production, there are also major public health and ethical concerns. There is evidence of animal farms providing an ideal environment for pathogens to mutate and spread and contribute to pandemic outbreaks (Bryant & van der Weele, 2021; Karesh et al., 2012). A large majority of infectious diseases originate in animals, such as swine and avian flu, which repeatedly occur in the farming industry, as well as food-borne pathogens such as *Salmonella*, *Campylobacter,* and *Escherichia coli* from animal food and fecal contamination in slaughterhouses (Espinosa, Tago, & Treich, 2020; Gasteratos, 2019).

Animal agriculture has also been criticized for the wellbeing of slaughterhouse workers. For instance, in 2020, a Cargill slaughterhouse in Alberta reported three deaths in relation to a COVID-19 outbreak, of which over 1,500 cases were linked to the plant (Rieger, 2020). The news comes after employees at the plant accused the company of ignoring physical distancing protocols luring them back to work from self-isolation, even testing positive for COVID-19 (Rieger, 2020).

1.2 Limitations of Existing Plant-based Meat Alternatives

With the urgent need to reduce GHG emissions, encouraging consumers to swap meat with plant-based alternatives, such as soy-based products that mimic meat, may be a viable solution to curb the growing demand for meat and play a key role in helping achieve climate goals. In Canada, more than 40% of the population is actively trying to incorporate more plant-based foods into their diets (National Research Council Canada, 2022). In response, the plant-based and alternative protein market continues to become more accessible, and was valued at $499.1 million CAD in Canada in 2021; this market is expected to achieve a compound annual growth rate (CAGR) of more than 7% during 2021-2026 (Global Data, 2022). Furthermore, in

order to meet the growing demand for plant-based protein, the government of Canada has invested over $1.4 million in Big Mountain Foods Ltd. to commercialize a plant-based soy-free tofu product made from Canadian grown chickpeas (Agriculture and Agri-Food Canada, 2022).

Though recent supply chain issues and inflation as a result of the COVID-19 pandemic have resulted in price fluctuations in meat markets, plant-based alternatives have had limited success in curbing the demand for meat (Farm Credit Canada, 2022). While beef and pork consumption has decreased in recent years in Canada, chicken, which is the most consumed meat at 76.04 pounds per year per capita, has risen by almost 20 pounds since 1998 (Statistics Canada, 2022c). Perhaps consumers are eating plant-based meat in addition to traditional meat as opposed to as an alternative, as there are strong social, personal, and cultural values around eating meat (Macdiarmid, Douglas, & Campbell, 2016). A study by Neuhofer and Lusk (2022) used household scanner data to analyze consumers' buying behaviours of plant-based meat and found about 20% of consumers purchased it at least once, while 12% purchased it on multiple occasions. Interestingly about 86% of buyers of plant-based meat also bought ground meat, and after a household's first purchase of plant-based meat, ground meat consumption did not fall (Neuhofer & Lusk, 2022). Ultimately, the promise of plant-based meat alternatives to lessen the environmental impacts of meat consumption depends on market acceptance and the extent to which they displace meat in consumers' diets (Neuhofer & Lusk, 2022).

Another contributing factor as to why plant-based meat has had limited success in competing with the meat market may be a lack of awareness of how meat consumption contributes to climate change. Focus group discussions in Scotland used to explore public understanding of the environmental impact of food found a lack of awareness of the association (Macdiarmid et al., 2016). Further, participants perceived personal meat consumption as playing a minimal role in the global context of climate change, and showed resistance to the idea of reducing meat consumption (Macdiarmid et al., 2016). However, the United Nation's Food and Agriculture Organization (FAO) has made clear the link between animal agriculture and climate change since 2006, stating how the livestock sector causes major stress on many ecosystems and the planet (Steinfeld et al., 2006).

Finally, whole cuts of meat like a steak or cutlets are difficult to replicate precisely with plant-based ingredients. A survey on German participants conducted by Michel, Hartmann, and Siegrist (2021) found meat alternatives have the best chance of successfully replacing conventional meat when they closely resemble highly processed meat products in taste and texture and are offered at a competitive price point.

1.3 Cell Cultured Meat: What is it, and when will it become available?

Given the limitations that plant-based meat alternatives have had in destabilizing the meat markets, cell cultured meat has been proposed as a solution to convince more consumers to make the switch away from traditionally produced meat. Cell cultured meat, also called cultivated meat, synthetic meat, lab grown meat, clean meat, or in-vitro meat, is a part of a novel industry referred to as cellular agriculture. Cellular agriculture aims to replicate conventionally produced meat through cell and tissue culture (Post et al., 2020). Stem cells can be isolated from a biopsy from a living animal and expanded in-vitro to replicate (Post et al., 2020). Subsequently, the cells can be stimulated to differentiate into muscle or fat cells (Post et al., 2020). Finally, the differentiated cells can then be organized to resemble meat in its sensory and nutritional qualities as closely as possible (Post et al., 2020).

Lab grown meat is no longer something only seen in sci-fi movies, and could become more accessible to consumers in the near future. The possibility of producing meat in a lab became a reality in 2013, after Dutch scientist Mark Post unveiled the first cultivated meat burger (Good Food Institute, 2022). Singapore became the first jurisdiction to green light the sale of cultured meat in 2020; since then, cell cultured chicken produced by GOOD Meat -a division of San-Francisco based JUST Eat- have become available in restaurants (Daga & Gibbs, 2020). Cell cultured meat has also caught the attention of investors. The cell cultured meat startup UPSIDE Foods is backed by Tyson, the world's largest producer of chicken, who invested in the company (previously known as Memphis meats) in 2018, followed by Whole foods in 2020 (Upside Foods, 2022).

In the United States, the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) have reached

an agreement to jointly regulate cell-cultured meat (United States Department of Agriculture [USDA], 2021). The FDA will oversee cell collection, growth, and differentiation of cell cultures, while USDA will run safety inspections, as well as conduct cell harvest, processing, packaging, and labeling of cell cultured meat (USDA, 2021). In November 2022, the FDA for the first time cleared a meat product from UPSIDE Foods grown from animal cells for human consumption (Douglas, 2022). Shortly after, in March 2023, GOOD meat passed a major FDA safety hurdle, bringing their products one step closer to selling their products in the US (Aubrey, 2023). Later in June 2023, US regulators approved for the first time, the sale of cell cultured chicken to both Upside Foods and Good Meat (Food in Canada, 2023). The USDA has also invested in cellular agriculture with a $10 million dollar grant that will go to establish the National Institute for Cellular Agriculture at Tufts University (Nature Biotechnology, 2021).

In the Canadian market, The Cultivated B. (TCB), a Canadian bioengineering company, opened its manufacturing facility in Ontario that will enable other businesses to produce alternative proteins at an industrial scale, including cell cultured meat (Food in Canada Staff, 2022). The company has a budget of over $50 million to invest in the facility that will be used to build bioreactors and high-precision devices for cellular agriculture (Food in Canada Staff, 2022). Additionally, the Canadian cell cultured meat startup Evolved meats raised $2 million in seed funding led by Maple Leaf Foods to accelerate product development (Evolved Meats, 2022).

1.4 The (Potential) Advantages and Disadvantages of Cell Cultured Meat

The rollout of cell cultured meat is highly anticipated because it has the potential to reduce greenhouse gas emissions, preserve biodiversity, reshape economic networks, prevent disease outbreaks, and reduce animal suffering. Tuomisto and Teixeira de Mattos (2011) estimated that, compared to conventionally produced meat, cell cultured meat requires approximately 7–45% less energy, 99% less land, and 82–96% less water and generates 78–96% less greenhouse gas emissions. Despite high uncertainty, Tuomisto and Teixeira de Mattos (2011) determine the overall environmental impacts of cell cultured meat production are significantly lower than those of conventionally produced meat. Further, a lifecycle assessment by Kim, Beier, Schreyer, and Bakshi (2022) found that compared to a traditional beef burger,

cultivated meat burgers from SCiFi Foods generated 87% less greenhouse gas emissions, required 39% less energy, had 90% less influence on land use, and 96% less water use. In fact, the cultivated meat burger was found to have a life cycle environmental impact comparable with plant-based burgers by Beyond Meat and Impossible foods that are currently on the market (Kim et al., 2022). Since cultured meat could be produced in countries with little or no agricultural land, it comes to no surprise that Singapore is the first country to commercialize cultured meat (Treich, 2021). The development of cultured meat has the potential to change the location of local and global production, in turn reshaping economic and social networks (Treich, 2021).

However, a review by Chriki and Hocquette (2020) suggests these types of comparisons are often incomplete and biased. The potential advantage of cell cultured meat over traditional meat, for instance in terms of greenhouse gas emissions is not obvious, as it is based on speculative analyses. Treich (2021) doubts that in-vitro muscle development, which has evolved naturally over millions of years, will be able to be produced efficiently in terms of resource use. For instance, cell cultured meat could contribute to carbon dioxide emissions if fossil fuels are used to warm cultured cells, a greenhouse gas that accumulates more in the atmosphere than methane, from the digestive tracts of herbivores (Chriki & Hocquette, 2020). Despite estimates from Tuomisto and Teixeira de Mattos (2011) suggesting cellular agriculture will require less energy compared to traditional methods, a large amount of energy will still be required to produce the ingredients for the growth medium and for running the bioreactor (e.g., for temperature control, aeration and the mixing processes) (Treich, 2021). As a result, there is no agreement as of yet if cultured meat can achieve price parity with mainstream conventional meat once produced at an industrial scale, with Orzechowski (2015) believing it will never be achievable (Treich, 2021).

There are also economic concerns regarding the transition from traditional animal agricultural practices to the adoption of cell cultured meat. On a national scale, there may be a costly transition for the workers in the conventional animal farming sector, including animal farmers, animal feed producers, vets, etc. (Treich, 2021). Further, it is still uncertain what traditional agricultural products (legumes, sugars etc.) will be used as nutrients in the growth medium for cell cultured meat, and the extent to which the newfound demand for these inputs

will create opportunities to gain value in this new sector (Newton & Blaustein-Rejto, 2021; Treich, 2021). Though, semi-structured interviews conducted by Newton and Blaustein-Rejto (2021) with 37 experts from cultured and plant-based meat companies, non-profits, funding agencies, governmental agencies, researchers, and farmers found there was a wide range of opinions on the extent of which cell cultured meat could minimize the need for animal agriculture and the percentage of the protein market that it could eventually control, but none of the interviewees believed that it would completely replace animal agriculture in the near future.

1.5 Consumer Acceptance of Cultured Meat

Though companies like Beyond Meat and Impossible foods have created plant-based meat alternatives that closely resemble the taste and texture of traditional meat, it is suspected that the demographic for plant-based meat alternatives and cell-cultured meat will be distinct, drawing a new group of consumers who will shift away from conventionally produced meat. In a discrete choice experiment where participants could choose among cell cultured, organic, and plant-based burgers, Slade (2018) finds a positive correlation between preferences for plant-based and cultured meat burgers, suggesting similar motivations for choosing non-traditional meat products. However, his findings suggest that individuals prefer plant-based burgers to beef, but not cell cultured burgers to beef (Slade, 2018). These findings help explain reports that whilst vegetarians and vegans had more positive perceptions of some aspects of cultured meat, they were significantly less willing to consume it than were omnivores (Slade, 2018). Most vegans and vegetarians may simply not care for the innovation and stick to their current eating habits, depending on their reasoning for avoiding meat in the first place (Ruby & Heine, 2011). For instance, those that don't like the taste of meat, or believe meat to be unhealthy are likely satisfied with the plant-based options currently available. Additionally, those that avoid meat for religious reasons may not be interested in the new technology. Alternatively, those that avoid meat for ethical reasons but still enjoy the taste may be attracted by the possibility of eating meat without hurting animals (Treich, 2021). As for those that avoid meat for environmental reasons, they may be concerned by health impact uncertainties, or the energy-intensive and technical aspects of its production and may reject cultured meat on these grounds (Treich, 2021).

The major perceived advantage of cell cultured meat is that it will be molecularly extremely close to meat, and thus may become an almost perfect substitute to meat in terms of taste and texture. (Treich, 2021). Therefore, cell cultured meat may reach a different demographic than that of plant-based meats. Because of its ability to mimic the experience of eating traditionally produced meat, cell cultured meat could attract the likes of meat eaters. However, it is not currently known who exactly the target demographic will be.

A study by Neuhofer and Lusk (2022) found those that buy plant-based meat tend to be young, single, female, college educated, employed, higher income, and non-white. Alternatively, various studies have found higher acceptance of cultured meat amongst men compared to women, amongst younger people compared to older people, and amongst omnivores compared to vegetarians (Bryant & Barnett, 2018; Post et al., 2020; Van Loo, Caputo, & Lusk, 2020). Moreover, the demographic trends observed in acceptance of cell cultured meat are consistent with those seen in the case of other emerging food technologies (Bryant & Barnett, 2018). For instance, studies on acceptance of genetically modified organisms (GMOs) have observed higher acceptance amongst males than females, amongst younger people, and amongst those with more education and familiarity with the technology (Bryant & Barnett, 2018).

A possible explanation for why men are more likely to consume cell cultured meat is that in the U.S. and many other Western post-industrial societies, food is gendered, with some foods viewed societally as masculine and others as feminine. Foods that are considered masculine typically include beef, especially steak and hamburgers (Sobal, 2005). Meat symbolizes strength and virility, as Western men are often characterized by their suppression of emotions, which is a useful attribute for the hunting and eating of animals (Sobal, 2005). Further, meat is commonly viewed as an archetypal food for men, with many men not considering a meal without meat to be a “real” meal (Sobal, 2005). In a study by Ruby and Heine (2011), participants were asked to rate the personality of hypothetical people from a small amount of information, and found omnivorous and vegetarian participants considered vegetarians to be more virtuous and less masculine than those who ate meat.

There is also a cultural influence on the acceptance of cultured meat. The novel product appears to be more appealing to consumers in China and India where purchase decisions were predicted by perceived health/nutrition and ethical priorities, respectively (Bryant & Barnett, 2020; Bryant, Szejda, Parekh, Deshpande, & Tse, 2019). In contrast, Americans and Europeans were less accepting of cultured meat, with perceived naturalness playing an important factor in cultured meat acceptance (Michel & Siegrist, 2019; Weinrich, Strack, & Neugebauer, 2020; Wilks, Phillips, Fielding, & Hornsey, 2019).

Cultured meat also raises very practical issues in terms of religion. Hamdan, Post, Ramli, and Mustafa (2018) and Chriki and Hocquette (2020) explain is not clear whether in Islam and Judaism if cultured meat is halal and kosher, respectively. Some religious authorities argue cell cultured meat can only be permitted if the original cells were taken from an animal slaughtered in a way consistent with religious practices (i.e., in a kosher or halal way), and in the case of halal, no blood nor serum being used in the process (Chriki & Hocquette, 2020). Meanwhile others believe under Jewish law cell cultured meat cannot be forbidden for consumption, considering the final product as a new entity, as opposed to an inheritance of the starter cells (Kenigsberg & Zivotofsky, 2020). Additionally, there is uncertainty for the acceptance of cell cultured meat in religions that encourage vegetarianism, such as Buddhism or Jainism (Treich, 2021).

Cell cultured meat had also been a controversial topic of conversation in social media. A qualitative content analysis in 2013 of the online comments made on articles from articles reporting on the first cell cultured burger conclude environmental motivations for consuming cell cultured meat were uncompelling and problematic, also noting that the overall tone of the comments was more negative than positive (Laestadius & Caldwell, 2015). However, this finding contrasts a more recent study looking at how social media can influence behaviour related to agricultural issues. The researchers collected Twitter (now known as X) activity data with Sysmos Media Analysis Platform (MAP), finding a spike in popularity in the search terms “cultured meat” and “lab grown meat” when newsworthy events occurred related to cultured meat and other meat-related stories (Specht, Rumble, & Buck, 2020). The discussions about cell cultured meat centered on topics including legality and marketing, sustainability, acceptance, business, animal concerns, science and technology, health concerns, and timeline (Specht et al.,

2020). Interestingly, conversations on Twitter related to sustainability of cell cultured meat were predominantly positive, with the majority of users feeling that cell cultured meat is good for the environment (Specht et al., 2020). Perhaps this shift in general attitudes towards acceptance of cell cultured meat suggest acceptance increases as the technology improves and more accurate quantitative measures of the benefits of cell cultured meat over traditional are provided.

Finally, there also appears to be a strong political influence on cell cultured meat acceptance. A systematic review by Bryant and Barnett (2018) finds people with more liberal political views are significantly more willing to try cultured meat than those with conservative views. However, when it comes to other food preferences like eating gluten, a study by Malone and Norwood (2020) found politically liberal Americans are not more likely to exhibit an avoidance. More surprisingly, Donald Trump supporters were more likely than non-supporters to avoid gluten (Malone & Norwood, 2020). The study concludes that extreme liberals and extreme conservatives have almost identical gluten avoidance values, suggesting political ideology has no linear relationship with attitudes towards gluten (Malone & Norwood, 2020). Similarly, a US consumer preference study finds the most liberal and most conservative respondents had the same level of concern for GMO safety, higher than consumers with more moderate political views (Lusk, McFadden, & Wilson, 2018). It is unclear if similar conclusions can be drawn regarding attitudes towards cell cultured meat.

1.6 Food Neophobia and Technophobia

As with GMO safety, the more precise reason as to why some consumers will inherently be hesitant to try cell cultured meat may have to do with a fear of new foods and food technology. Wilks et al. (2019) show that attitudes towards and willingness to eat cultured meat are predicted by food neophobia, which Pliner and Hobden (1992) define as the aversion to novel foods. In other words, participants with high food neophobia tend to have negative attitudes towards and a lower willingness to eat cultured meat (Dupont, Harms, & Fiebelkorn, 2022; Wilks et al., 2019) including attitudes of disgust towards cell cultured meat (Siegrist & Hartmann, 2020). Bryant et al. (2019) identify a similar trend, demonstrating Chinese, Indian and American participants with high food neophobia and low familiarity with cell cultured meat had

lower acceptance. Further, Dupont and Fiebelkorn (2020) find German children and adolescents with higher levels of food neophobia are less willing to eat a cultured meat burger.

As for food technology neophobia, or technophobia, there has been limited, conflicting research thus far on how it impacts willingness to consume cultured meat. Cox and Evans (2008) define food technology neophobia as the reluctance to eat food produced using novel technologies such as genetic modification, pasteurization, and high-pressure processing. While Gómez-Luciano, de Aguiar, Vriesekoop, and Urbano (2019) find food technology neophobia had no effect on willingness to purchase cultured meat among participants from the United Kingdom, Spain, Brazil, and the Dominican Republic, Heidmeier and Teuber (2023) find an increasing food technology neophobia score correlated with a reduced likelihood of acceptance. Additionally, Bryant and Dillard (2019) and Siegrist, Sütterlin, and Hartmann (2018) demonstrate that participants given information about the technological process of cultured meat had a lower the willingness to try, buy and eat cultured meat as a replacement for conventional meat. This trend is also observed in other novel foods, such as insect-based foods (Schlup & Brunner, 2018; Verbeke, 2015).

1.7 Comparison to GMOs

A major concern with cell cultured meat is the public perception of the new technological innovation. Food produced with novel technologies, such as genetically modified organisms (GMOs), have been met with strict regulations by the European Food Safety Authority (EFSA), and have been successfully framed by some non-governmental organizations (NGOs) in Europe as a threat to biodiversity, farmer autonomy, and food safety (Lucht, 2015). A survey administered in Belgium, France, the Netherlands, Spain, and the United Kingdom found participants were willing to pay a significant premium to avoid purchasing rice labeled as genetically modified (Delwaide et al., 2015). Additionally, a multi-country assessment found only 56 and 47 percent of consumers in in the US and Canada, respectively, were willing to consume both genetically modified and gene edited (i.e., CRISPR) food, and valued the food substantially less than conventional food (Shew, Nalley, Snell, Nayga Jr, & Dixon, 2018). Bánáti (2011) believes the European public was not informed about the advantages and disadvantages

of GMO technology in a timely manner, thus they could not properly assess the consequences and the level of risks, resulting in a certain level of fear of the unknown.

As Tomiyama et al. (2020) note, a major driver of the public skepticism about GMOs is rooted in the powerful role of agri-business in their promotion of the innovation; therefore, the role of researchers in conducting unbiased research and academics in communicating factual information to the public may be critical to ensure widespread adoption of these products. To address concerns and fears of novel food technologies and food safety, some organizations such as the EFSA in Europe and the Canadian Food Inspection Agency (CFIA) in Canada have made efforts to provide more information to consumers (Bánáti, 2011; Sutherland, Sim, Gleim, & Smyth, 2020). The EFSA has implemented systems to increase confidence in European food policy such as the risk analysis framework, a science-based system that allows for risk assessment to be carried out independently from risk management (Bánáti, 2011). Additionally, a study examining Canadian consumer perceptions of the food safety system find Canadians have high confidence in the food safety system and trust in members of the food supply chain, but desire improvements in communication of food risk information (Sutherland et al., 2020).

1.8 Impact of the COVID-19 pandemic on public trust of science

The beginning of the COVID-19 pandemic in March 2020 provides another example of how public perception of new technologies are shaped by the ways in which information is presented. The way the public was informed about COVID-19 by medical professionals, government officials, and public health agencies about the origins and transmission of the new virus, as well as the safety and efficacy of treatments and vaccines, created an environment uniquely vulnerable to the proliferation of misinformation and disinformation. Since much of the evidence needed to fully inform clinical and public health responses was not available early in the pandemic, public health recommendations changed rapidly as more information became available. This resulted in tremendous anger, uncertainty, and fear among citizens (Jaiswal, LoSchiavo, & Perlman, 2020). False information was and continues to be deliberately spread to deceive people, including what are often referred to as conspiracy beliefs (Jaiswal et al., 2020). It is possible that something similar could occur when cell cultured meat becomes available to the public. There may be lessons that can be learned from how public health agencies managed the

COVID-19 pandemic, including ways in which the spread of disinformation, misinformation, medical mistrust, and conspiracy theories could have been limited.

1.9 Subjective vs. Objective Knowledge

What the GMO and COVID-19 examples have in common is a lack of transparency and communication from experts and government officials, which led to doubts of the scientific evidence. However, what sets them apart is that the latter became a highly politicized issue in addition to a public health and safety issue. The sudden influx of large amounts of information surrounding the novel SARS-CoV-2 virus in 2020 was labeled information pollution and the crisis as an infodemic by the WHO (World Health Organization, 2020). As a result, doubts about scientific evidence as well as mistrust of politicians and other authorities arose. This made some people believe that measures such as social distancing and wearing face masks were ineffective at controlling the spread of the virus and vaccination was strategically intended (Gruener, 2022). Although it is commonly agreed that communicating quantitative information about benefits and risks is only meaningful if people are capable to process basic mathematical concepts, such as statistical numeracy and risk literacy (Gigerenzer, Hertwig, Van Den Broek, Fasolo, & Katsikopoulos, 2005), a study by Gruener (2022) suggests they only protect against misinformation to a certain extent.

Ortoleva and Snowberg (2015) believe susceptibility to misinformation may be due to a disconnect between subjective knowledge, which captures what individuals think they know about a topic (i.e., confidence), and objective knowledge, which is what individuals actually know. A study by Gruener (2022) finds high subjective knowledge and trust in social networks to be positively associated with believing misinformation. Subjects who tend to be politically right-oriented were more susceptible to misinformation in the context of both COVID-19 and climate change (Gruener, 2022).

Similarly, a study by Peschel, Grebitus, Steiner, and Veeman (2016) looking at how consumer knowledge affects environmentally sustainable choices finds subjective knowledge to be more important than objective knowledge in predicting environmentally friendly choice behaviour. Participants with high subjective knowledge on environmental issues were more

likely to make environmentally sustainable choices, and consumers with low objective knowledge were far less likely to make environmentally sustainable choices (Peschel et al., 2016).

In a study by Pieniak, Aertsens, and Verbeke (2010), subjective and objective knowledge were examined as factors influencing the consumption of organic vegetables. Subjective knowledge was assessed using a 7-point Likert scale that measured participants' agreement or disagreement with statements related to organic vegetables, ranging from "totally disagree" (1) to "totally agree" (7) (Pieniak et al., 2010). Objective knowledge, on the other hand, was evaluated by asking participants to indicate whether statements about organic agriculture were true or false (Pieniak et al., 2010). Similar to Peschel et al. (2016)'s findings, Pieniak et al. (2010) conclude subjective knowledge has a significant, strong and direct impact on organic vegetable consumption, while objective knowledge has only an indirect effect, as it influences subjective knowledge and positive attitudes towards organic vegetables.

1.10 Early Evidence of Politization of Cell Cultured Meat

As cell cultured meat gains approval in North America, there is already evidence of the politicization of the novel product. In 2018, U.S. Cattlemen's Association launched a petition - that was later denied- demanding the Food Safety and Inspection Service (FSIS) limit the definition of 'meat' and 'beef' to products derived from animals born, raised, and harvested in the traditional manner (Michael, 2021). Such action would effectively prohibit the labels of products made using animal cell culture technology or plant-based products from displaying the terms "meat" or "beef" (Michael, 2021). Debate surrounding labeling of cell cultured meat products evoked an empirical study by Gleckel (2020), which found consumers aren't more likely to believe plant-based products come from an animal if the product's name incorporates words traditionally associated with animal products than if it does not. Further, omitting words traditionally associated with animal products from the names of plant-based products causes more confusion amongst consumers regarding the taste and uses of these products (Gleckel, 2020). These results indicate that the introduction of new regulations to restrict the usage of terms like "beef" and "butter" on product labels does not effectively eliminate consumer misunderstandings (Gleckel, 2020).

Despite this finding, Texas has approved a bill labeled the “Texas Meat and Imitation Food Act,” which bans meat and beef labels from being used on plant-based and cell-cultured food. Beef is defined as “any edible portion of a formerly live and whole cattle carcass, not derived by synthetic or artificial means,” and a food is considered misbranded if the food “includes a label stating meat, beef, chicken, pork, or any common variation of those terms, if the food does not contain the products listed on the label ("Texas Meat and Imitation Food Act," 2021, p.3). The bill sparked controversy online, with many social media users criticizing the meat industry’s influence. Additional bans on cell cultured meat are already set to take place in Italy. In March 2023, Italy’s right-wing government has also approved a draft bill to ban cell cultured meat to protect Italian food heritage and health, a move praised by Italy’s farmer lobbyists (Kirby, 2023).

Further, in April 2021, articles circulated on social media, claiming President Joe Biden's climate plan will require Americans to cut 90% of meat from their diet, which is a maximum of 4lbs per year, or one burger per month (Crane, 2021). This headline comes after Biden announced a plan to reduce U.S. greenhouse gas emissions, with a goal of 2030 emissions being half the level of 2005 at a climate summit on April 22, 2021 (The White House, 2021). The claim originated at The Daily Mail, which published a story connecting Biden's plan to a 2020 study from the University of Michigan (Crane, 2021). However, the study solely focuses on the impact diet has on greenhouse gas emissions, finding diet-related greenhouse gas emissions would decrease to 51% by 2030 if beef consumption decreased by 90% and the consumption of all other animal-based foods decreased by 50% (Heller, Keoleian, & Rose, 2020). The beef decrease would result in each person eating four pounds of beef per year (Heller et al., 2020). However, Texas governor Greg Abbott tweeted a screenshot from Fox News, insinuating reducing meat consumption is a part of Bidens’ climate plan, with the caption “Not gonna happen in Texas!” (Abbott, 2021). This myth was later addressed by the Secretary of Agriculture Tom Vilsack during a virtual briefing hosted by the North American Agricultural Journalists, where he told reporters “There is no effort designed to limit people's intake of beef coming out of President Biden's White House or USDA" (McCrimmon, 2021).

1.11 Factors influencing consumer acceptance of cultured meat

For cell cultured meat to be accepted by consumers, there is evidence cell cultured meat must be priced lower than conventional meat (Blumenberg, 2022; Slade, 2018) and perceived to have high market share (Bryant & Barnett, 2018). However, Van Loo et al. (2020) find that even if lab-grown alternatives experienced significant (e.g., 50%) price decreases, conventional beef is likely to uphold the majority market share. Bryant and Barnett (2020) predict that in the long-term, concerns based in neophobia will decrease, and general acceptance of cultured meat will depend in large part on the price and taste.

In addition to price, providing information about new foods has also been demonstrated to influence consumer acceptance of food produced with novel technologies (Corrigan, Depositario, Nayga Jr, Wu, & Laude, 2009; Lusk et al., 2004). The same is true for the consumer acceptance of cell cultured meat (Hocquette et al., 2015; Siegrist et al., 2018; Verbeke, Sans, & Van Loo, 2015). As with plant-based meat alternatives like Beyond Meat and Impossible foods, which already communicate the environmental benefits of their products to consumers, it is expected for cell cultured meat companies to follow suit with highlighting the advantages of cell cultured meat when it becomes available for purchase (Heller & Keoleian, 2018; Khan, Dettling, Loyola, Hester, & Moses, 2019) The effect of highlighting the different benefits of cell cultured meat through information provision to consumers was tested experimentally in previous research, including providing information on the production process, as well as the environmental and animal welfare benefits.

1.11.1 Production process

When informing consumers about cell cultured meat, there is evidence to suggest that framing the novel food as a technological innovation is unappealing (Bryant & Barnett, 2018; Bryant & Dillard, 2019; Dupont et al., 2022; Tomiyama et al., 2020). For instance, a study by Bryant and Barnett (2018) found significantly higher acceptance of cultured meat when participants were given a non-technical description compared to a technical description of cell cultured meat, due to a difference in perceived naturalness and evoked disgust. Further, a study by Dupont et al. (2022) found food technology neophobia to be the strongest predictor of

negative general attitudes towards cell cultured meat. Additionally, a comparative analysis on the attitudes of rural and urban consumers towards cultured meat found that both groups listed safety of the technology as the biggest concern (Shaw & Iomaire, 2019). Only research by Van Loo et al. (2020) on U.S. consumers finds technology information has a minor effect on conditional market shares but reduces the share of people not buying any options, indicating information pulls more people into the market.

Overall, these findings suggest marketing strategies may be more successful if they encourage the natural perception of cultured meat (i.e., its similarity to traditionally produced meat) by enabling transparency about the production process (Dupont et al., 2022). Further, using a less technological product name can improve consumer acceptance of cell cultured meat (Bryant & Barnett, 2018; Dupont et al., 2022). Even labels such as 'lab-grown meat' invoke science and unnaturalness, which are significantly less appealing than names such as 'clean meat' that highlight the perceived taste, as well as health, and sustainability benefits compared to conventional meat (Bryant & Barnett, 2018).

1.11.2 Environmental benefits

In addition to providing technological information on the production process of cell cultured meat, previous research has also provided details on the environmental benefits of cell cultured meat as an information treatment (Verbeke et al., 2015), as cell cultured meat is generally framed as a more environmentally friendly choice for producing less greenhouse gas emissions, consuming less water, and requiring less land than traditional animal farming methods (Chriki & Hocquette, 2020). Research conducted by Verbeke et al. (2015) found that the provision of additional information on the environmental benefits of cell cultured meat increased consumers' willingness to try cell cultured meat to 43%, compared to only 24% in the control group. Similarly, research by Slade (2018) found participants that placed high importance on the environmental impact of food on purchasing decisions correlated with a stronger preference for cell cultured meat.

1.11.3 Animal welfare

To our knowledge, there are no research papers looking at consumer attitudes towards cell cultured meat that involves an information treatment that solely provides information surrounding the ethics of traditional vs. cell cultured meat on farmers and/or livestock without including other benefits of cell cultured meat. For instance, research by Siegrist and Sütterlin (2017) combines information about the ethical benefits, as well as the production process, health benefits, and environmental benefits in one information treatment, and found unnaturalness fully mediated the benefits of cell cultured meat. Bryant and Dillard (2019) and Blumenberg (2022) had a similar treatment design, combining ethical and environmental benefits into the same information treatment.

1.12 Research Question and Hypotheses

This study aims to provide a better understanding of how cell cultured meat will be perceived once it reaches the market. Specifically, we wish to understand how the impact of social media, media bias and reliability, subjective and objective knowledge, and food neophobia and technophobia among Canadian consumers affects their willingness to purchase cultured ground beef in grocery stores. Further, we investigate how participants' technophobia influences the efficacy of varying information treatments on WTP for cell cultured ground beef prior to the choice experiment.

This study differs from previous research as it examines the factors that influence Canadian consumers' decision making in greater depth. Not only will this study consider political affiliation, food neophobia and technophobia as in previous research, but will also record consumers' social media habits and the sources of news they trust, which can be quantified into a reliability and bias score. Additionally, participants will be tested on general knowledge related to animal agriculture and organic production in Canada, as well as cell cultured meat production, and give their confidence in their answers, which will serve to generate subjective and objective knowledge scores. This additional information will allow for a more nuanced understanding of how news and media habits, political leanings, and prior general knowledge all play a role in shaping consumer attitudes towards cell cultured meat.

Further, previous research by Slade (2018) and Van Loo et al. (2020) both look at how consumer acceptance of cell cultured meat is influenced by information about the products to determine market potential. However, to our knowledge thus far, we are the first to conduct a labeled hypothetical choice experiment with Canadian consumers that separate beef consumers from those that do not consume beef for both the information treatments and choice experiment. This is important to consider, as the potential for cell cultured meat to have a significant effect on agricultural GHG emissions rests on the amount of traditionally produced meat replaced in the marketplace. Thus, it is important to understand consumer acceptability among the Canadian population who eats meat on a regular basis.

Additionally, we are the first to collect data on participants' social media habits, and quantify their media bias and reliability in the context of consumer acceptance of cell cultured meat, to allow for a more nuanced understanding on how not only political affiliation, but susceptibility to misinformation and outlets that participants trust to provide reliable news can influence aversion to cell cultured meat.

We also provide information treatments on three different and distinct aspects of cultured meat: the production process, the environmental benefits, and animal welfare, to identify what marketing angles will be most effective in the promotion of cell cultured meat. The influence of the different information treatments will be used to determine their influence on willingness to pay (WTP) for cell cultured meat compared to a control group. The information treatments will be followed by a discrete choice experiment (DCE) to analyze consumer behaviour when presented with different meat products at varying prices. A DCE approach is used to determine consumer preferences, which has been widely utilized in meat demand analysis (Blumenberg, 2022; Lusk & Tonsor, 2016; Scarpa, Zanoli, Bruschi, & Naspetti, 2013; Van Loo, Caputo, Nayga Jr, & Verbeke, 2014). As cell cultured meat is not yet available to Canadian consumers at grocery stores, participants are asked to make hypothetical retail decisions based on the information given.

We hypothesize participants who consume media from reliable and unbiased sources will have a higher willingness to consume for cell cultured meat than those whose preferred media

sources are less reliable and more biased, as we believe participants who trust in reliable news sources are less susceptible to misinformation and will therefore be less fearful of cell cultured meat. Additionally, we hypothesize participants with high food neophobia and food technology neophobia will have lower willingness to consume cell cultured meat, driven by predicted notions on the taste and texture of cell cultured meat, and the fact that cell cultured meat production is a technology that is not well understood by the majority of the Canadian population. Also, we hypothesize subjective knowledge, but not objective knowledge will influence willingness to consume cell cultured meat, as subjective knowledge is generally what drives decision making.

We also hypothesize participants who are given additional information on the production process of cell cultured meat will have a lower WTP than those in the control group, but participants in the environmental and animal welfare treatments will have a higher WTP than those in the control group. Further, participants with high technophobia in the production process treatment will have lower WTP for cell cultured meat compared to conventional meat than those in the welfare, environmental, and control treatment groups, as we believe participants with high technophobia will be negatively receptive to technical information about the production process.

2 Conceptual and Empirical Models

2.1 Conceptual model

The Lancaster (1966) theory of demand provides researchers with a basis for studying consumer behaviour in the context of food attributes and innovations. Lancaster (1966) suggests that consumers obtain utility directly from the characteristics of a good rather than the good itself. However, utility is a subjective concept and depends on a consumer's preferences between bundles of characteristics. Therefore, each individual product can be seen as the sum of its multiple product quality attributes. Assuming that the relationship between the good and its embodied attributes is linear and objective, this relationship can be expressed as in Equation 1 below.

$$x_j = \sum_k a_{jk} y_k \tag{1}$$

Here x_j is the jth commodity, a_{jk} represents the kth quality attribute of x_j, and y_k is the level of attribute k. In our case, the function expresses the qualities of ground beef and ground beef alternatives x_j, differentiated by the attributes a_{jk} of production method and price at level k.

Following Lancaster's framework, two assumptions must be made about consumers' utility for meat. First, consumers derive utility from the consumption of ground beef products; and second, ground beef products vary in production method and price. Other possible factors influencing consumer's choice include demographic characteristics (e.g., age, income, gender, and education, political beliefs), media bias and reliability, subjective and objective knowledge on Canadian agriculture and cell cultured meat, and consumers' attitudes towards new foods and technology. Therefore, the consumer's utility function for differentiated ground beef can be written as:

$$U = f(P, PM, D, MB, MR, S, O, N, T, I) \tag{2}$$

where P is price, PM is production method, D is demographics, MB is media bias, MR is media reliability, S is subjective knowledge, O is objective knowledge, N is neophobia, T is technophobia, and I is information treatment that the individual receives.

Within this framework, consumer n is assumed to derive the following utility from choice alternative, j:

$$U_{nj} = V_{nj} + \varepsilon_{nj} \tag{3}$$

where V_{nj} is the systematic or observable component of the utility function, and ε_{nj} is the random or unobservable component. V_{nj} is defined as:

$$V_{nj} = \boldsymbol{\beta}_n' \boldsymbol{x}_{nj} \tag{4}$$

where $\boldsymbol{x}_{nj}$ represents the attributes of alternative j faced by individual n, in our case production method and price. The vector $\boldsymbol{\beta}_n'$ represents taste parameters that influence the probability that individual n chooses a particular meat type (i.e., the marginal utilities or preferences for each attribute level of that individual).

Substituting Equation 4 into Equation 3, the utility an individual receives can therefore be expressed as:

$$U_{nj} = \boldsymbol{\beta}_n' \boldsymbol{x}_{nj} + \varepsilon_{nj} \tag{5}$$

where $\boldsymbol{\beta_n}$, the vector of coefficients for individual n, can be expressed as:

$$\boldsymbol{\beta_n} = \boldsymbol{\beta} + \Delta \boldsymbol{z_n} + \boldsymbol{\Gamma v_n} \tag{6}$$

$\boldsymbol{z_n}$ is the vector of characteristics of individual n that influence the mean of the taste parameters, and $\boldsymbol{v_n}$ is a vector of random variables with zero means, known variances, and zero covariances. Therefore, in Equation 6, $\Delta \boldsymbol{z_n}$represents the observed heterogeneity, and $\boldsymbol{\Gamma v_n}$ represents unobserved heterogeneity. We estimate the structural parameters, in this case the constant vector $\boldsymbol{\beta}$, the matrix of attributes and individual characteristics of parameters Δ**,** and the non-zero elements of the lower triangular Cholesky matrix, $\boldsymbol{\Gamma}$ (Hensher, Rose & Greene, 2015).

Considering the specific attributes of the ground beef options, the consumer's utility function she receives from choice j at time $t \in T$ for differentiated ground beef can therefore be written as:

$$\begin{aligned} U_{njt} = \beta_{0n} ASC_{nt} + \beta_{1n} price_{njt} + \beta_{2n} CellCultured_{njt} \\ + \beta_{3n} Organic_{njt} + \varepsilon_{njt} \end{aligned} \tag{7}$$

where ASC_{nt} is the alternative specific constant which represents the no choice option, capturing the variation in choices that is not explained by the attributes, and β_{1n} through β_{3n} are coefficients associated with the observable attributes, price, and production method.

Additional variables for the information treatments and individual characteristics can be incorporated into individual n's utility function as interaction terms with the product attributes. The consumer's utility function for differentiated meat types (cell cultured, organic, conventional) interacted with the information treatments (control, production process, environment, welfare) and/or individual characteristics (ex. technophobia) can be written as:

$$\begin{aligned} U_{njt} = \beta_{0n} ASC_{nt} + \beta_{1n} price_{njt} + \beta_{2n} CellCultured_{njt} \\ + \beta_{3n} Organic_{njt} + \boldsymbol{\delta'_n}(\boldsymbol{z_n}' \boldsymbol{x_{njt}}) + \varepsilon_{njt} \end{aligned} \tag{8}$$

where $\boldsymbol{\delta'_n}$ is a vector of coefficients associated with the interaction terms, and $\boldsymbol{z_n}$ is a vector of the individual specific characteristics, in our case the information treatments and individual characteristics, used to interact with product attributes $\boldsymbol{x_{njt}}$. In this case, the observable component with interaction terms W_{njt} is now defined as:

$$W_{njt} = \boldsymbol{\beta'_n x_{njt}} + \boldsymbol{\delta'_n}(\boldsymbol{z_n}' \boldsymbol{x_{njt}}) \tag{9}$$

2.2 Logistic model

To consider questions surrounding consumer preferences and individual choice behaviour, choice-based research methods and logistic regression models have been widely applied in economics regarding cell cultured meat. See, for example, Slade (2018) and Van Loo et al. (2020). Concerning the estimation of empirical economic models, different logit models have been used in the stated choice literature. The mixed logit model, also known as the random-parameters logit model, presents a generalization of the standard logit model that allows individual model parameters to vary randomly across consumers, and is consistent with discrete choice analysis (McFadden, 1973; McFadden & Train, 2000).

A mixed logit model is used for the analysis of the discrete choice experiment, where the error term is not restricted to a normal distribution as with the probit model. Hence, we allow more flexibility in modeling the distribution of unobserved factors affecting choices. This is especially useful when there is variation in the effect of a factor across groups or individuals, but some of the variation is systematic (i.e., the information treatments) and some is random (i.e., preconceived notions about cell cultured meat). Hence, the mixed logit model avoids major limits of the standard logit model, in our case, allowing for random variation among participants, and unrestricted substitution patterns between choices (Train, 2009).

To estimate the impact of individual characteristics on participants' willingness to consume cell cultured meat, we can estimate the probability that alternative j is chosen among J alternatives available to individual n. The probability that individual n chooses alternative j in choice set t can be denoted as:

$$Prob\left(Choice_{nt} = j \middle| \boldsymbol{x_{njt}}, \boldsymbol{z_n}. \boldsymbol{v_n}\right) = \exp\left(V_{njt}\right) / \sum_{j=1}^{J_{nt}} \exp\left(V_{njt}\right) \qquad (10)$$

where $\boldsymbol{x_{njt}}$ represents the K attributes of alternative j, faced by individual n in choice situation t, in our case production method and price. The coefficients estimated on the production methods (i.e., cell cultured and organic meat), as well as the coefficient estimated on price are normally distributed random coefficients. V_{njt} represents the observable component of the utility function, as in Equation 4, and is a function of $\boldsymbol{z_n}$ and $\boldsymbol{v_n}$. $\boldsymbol{z_n}$ is the set of M characteristics of individual n

that influence the mean of the taste parameters from Equation 6, in our case demographic variables, media bias, media reliability, subjective knowledge, objective knowledge, neophobia, technophobia and information treatments. These case-specific variables are constant for each individual and choice set. $\boldsymbol{v_n}$ is a vector of K random variables with zero means, and known variances, and zero covariances, as in Equation 6.

We are also interested in how consumers' technophobia levels will impact the efficacy of the information treatments to influence decision making. To do so, we estimate the mixed logit model parameters by maximum simulated likelihood. The probability that individual n chooses alternative j at time t, conditional on the random parameter β_j from Equation 8, is defined by:

$$Prob\left(Choice_{nt} = j \middle| \boldsymbol{x_{njt}}, \boldsymbol{z_n}. \boldsymbol{v_n}\right) = \exp\left(W_{njt}\right) / \sum_{j=1}^{J_{nt}} \exp\left(W_{njt}\right) \qquad (11)$$

Where W_{njt} represents the observable component with interaction terms, from Equation 9.

Marginal willingness to pay (WTP) estimates can be estimated for different product attributes k with the following equation, which takes the negative of the ratio of the mean of the coefficient estimated on the individual attribute over the median of the price coefficient (β_{1n}):

$$WTP_k = -\frac{\beta_k}{\beta_1} \qquad (12)$$

or with interaction terms under the conditional logit model can be calculated as:

$$WTP_k = -\frac{\beta_k + \delta_k}{\beta_1} \qquad (13)$$

2.3 Specific hypotheses

We hypothesize that price has a negative effect on consumers' willingness to choose a meat product, and that consumers are less willing to choose cell cultured meat and more willing to choose organic meat, compared to conventionally produced ground beef. Specifically, we hypothesize that, from Equation 8:

H1.1: $\beta_{1n} < 0$
H1.2: $\beta_{2n} < 0$
H1.3: $\beta_{3n} > 0$

As discussed in Section 1.12, we hypothesize that participants who are given additional information on the production process of cell cultured meat will be willing to pay less for it than those in the control group, but receiving information about the environmental and animal welfare benefits of cell cultured meat will be willing to pay more. We also hypothesize that participants who consume media from reliable and unbiased sources will have a higher willingness to consume cell cultured meat than those whose preferred media sources are less reliable and more biased. Additionally, we hypothesize participants who express higher levels of food neophobia and food technology neophobia will be less willing to consume cell cultured meat. Also, we hypothesize subjective knowledge, will influence willingness to consume cell cultured meat.

We also hypothesize that males are more likely to consume cell cultured meat, as shown in previous literature (Bryant & Barnett, 2018). Also, we hypothesize that participants that consume their news mainly from social media and do not trust mainstream news outlets will be less likely to consume cell cultured meat as social media is where the validity of mainstream reporting is often brought into question, as exemplified in section 1.10 with the misinterpretation of Joe Biden's climate plan. In contrast, we hypothesize that participants who consume many mainstream new sources will be more likely to consume cell cultured meat.

These hypotheses are formalized below. We hypothesize the signs of the coefficients estimated on the individual characteristics from Equation 2 (represented by $\boldsymbol{z_n}$ in Equation 8) to be:

H2.1: $\delta_{averagetechnophobia} < 0$
H2.2: $\delta_{averageneophobia} < 0$
H2.3: $\delta_{average_tf_score} = 0$
H2.4: $\delta_{averageconfidence} < 0$
H2.5: $\delta_{averagebias} = 0$
H2.6: $\delta_{averagereliability} > 0$
H2.7: $\delta_{male} > 0$
H2.8: $\delta_{mainnewssocialmedia} < 0$
H2.9: $\delta_{donottrustanynews} < 0$
H2.10: $\delta_{totalnewssources} > 0$

For the interaction term variables contained in $\boldsymbol{\delta_n'}(\boldsymbol{z_n}'\boldsymbol{x_{njt}})$ in Equation 8**,** which represents the product attributes interacted with the information treatments and technophobia levels, we hypothesize participants who are given additional information on the production

process will have a lower WTP for cell cultured meat, but participants in the environmental and welfare treatments will have a higher WTP for cell cultured meat than those in the control group. Specifically, we hypothesise:

H3.1: $\delta_{productionprocess*cellcultured} < 0$
H3.2: $\delta_{environemntgroup*cellculutred} > 0$
H3.3: $\delta_{animalwelfare*cellcultured} > 0$

Further, we hypothesise that those with high technophobia who receive information about the production process will have lower WTP for cell cultured meat compared to conventional meat than those in the welfare, environmental, and control treatment groups. Specifically, we hypothesise:
H3.4: $\delta_{technophobia*productionprocess*cellcultured} < 0$

3 Survey Design

The survey was administered using LimeSurvey (www.limesurvey.org) to 199 participants recruited through Amazon Mechanical Turk (MTurk). The crowdsourcing platform connected me with participants willing to complete the survey in exchange for payment. To be eligible to complete the survey, participants must have been adults residing in Canada. Participants were given the option to complete the survey in either English or French. Prior to beginning the survey, participants consented to participate in the survey, and declared whether they agreed to having their de-identified data retained for future research.

The survey was divided into 7 sections in the following order: demographics, food neophobia and food technology neophobia, media and social media use, subjective vs. objective knowledge, information treatment, discrete choice questions, and debrief questions. Participants were able to go back to a previous section in the survey at any time. None of the questions in the survey were mandatory to move onto the next section or complete the survey. Full copies of the French and English versions of the survey are included in Appendix 7.5.

3.1 Demographics

The demographics section included questions regarding gender, location, languages spoken, income, education, political views, race, ties to the agricultural sector, grocery shopping habits, and dietary preferences and restrictions.

3.2 Food neophobia and food technology neophobia

The food neophobia and food technology neophobia section presented participants with eight statements: four on food neophobia and four on food technology neophobia. Food neophobia was assessed with questions from the food neophobia scale developed by Pliner and Hobden (1992) to quantify reluctance to eat and/or avoidance of novel foods. Just as Lammers, Ullmann, and Fiebelkorn (2019) and Dupont et al. (2022) the statements were scored on a 5-point Likert scale, as opposed to the original 7-point scale. Food technology neophobia was assessed with questions by Cox and Evans (2008) to quantify receptivity to foods produced by novel technologies The food neophobia scale (Siegrist & Hartmann, 2020; Wilks et al., 2019) and the food technology neophobia scale (Heidmeier & Teuber, 2023) have been used in previous research on cell cultured meat acceptance.

To reduce question fatigue, 4 of the 10 neophobia questions were used from Pliner and Hobden (1992) and 4 of the 13 food technophobia questions were used from (Cox & Evans, 2008). Participants indicated their agreement with the statements on a five-point scale ranging from strongly agree to strongly disagree. The order of the questions was randomized for every participant, and half of the questions were reverse coded.

3.3 Media and social media use

The media and social media use section asked participants to select news sources they trust to provide reliable news information from a list of 14 popular media outlets in Canada, along with other questions regarding preferred news media type and social media use. We acknowledge that by asking what sources the participants trust does not necessarily capture the sources they actually consume, but posing the question this way makes for a better indicator of the outlets that participants trust to provide reliable news. For instance, a participant may believe that particular news sources are unbiased and reliable, but not read them. Alternatively, a

participant may consume news from biased and unreliable sources, while being cognisant of said bias and reliability, but consumes them to garner opinions on a given topic from multiple perspectives. Scores for media bias and factuality were constructed from rankings provided by Media Bias Fact Check (https://mediabiasfactcheck.com/). A study by Scientific Reports argues that while Media Bias/Fact Check's credibility is sometimes questioned, it is deemed accurate enough to be used as ground-truth, for instance as media bias classifiers and fake news studies (Chołoniewski et al., 2020). For instance, Bovet and Makse (2019) used Media Bias Fact Check, along with other fact checkers to assess the bias of news articles shared on Twitter from fake news and extremely bias websites to measure the influence of fake news on Twitter during the 2016 US presidential election.

The organization gives each news source a bias score from extreme left to extreme right[1] and a factuality score that ranges from very high to very low[2]. We included 14 national news sources in both French and English that participants would recognize and that varied in their bias and factuality scores. The included sources' bias scores vary from right to left center, and the factuality scores from mixed to highly factual. Due to the lack of variation in the factuality of chosen news sources, each news source will be classified as either highly factual or not highly factual, including sources which are deemed to be mostly factual or mixed.

The bias and factuality scores are shown in Table 1 and Table 2 below.

3.3.1 **Table 1:** Adjusted bias and factuality scores for media sources, with numerical values for data analysis

Bias:	Score
Left center	1
Least biased	0
Right center	-1
Right	-2

[1] Media outlets are given a bias rating of extreme left, left, left center, least biased, right center, right, or extreme right.
[2] Outlets are given a factuality rating of very high, high, mostly factual, mixed, low, or very low.

Factuality:	
Highly factual	1
Not highly factual (mostly factual, mixed)	0

3.3.2 **Table 2:** Media bias and factuality numeric transformation summary table

News source	**Bias**	**Numeric bias score**	**Factuality**	**Numeric factuality score**
The Globe and Mail	Right center	-1	Highly factual	1
National Post	Right center	-1	Highly factual	1
CBC	Left center	1	Highly factual	1
Global News	Left center	1	Highly factual	1
CTV News	Least biased	0	Highly factual	1
Buzzfeed News	Left center	1	Mostly factual	0
Rebel News	Right	-2	Mixed	0
Toronto Sun	Right	-2	Mostly Factual	0
The Tyee	Left center	1	Highly factual	1
Vice News	Left center	1	Mostly factual	0
TVA Nouvelles	Left center	1	Mostly factual	0
La Presse	Left center	1	Highly factual	1
Le Devoir	Least biased	0	Highly factual	1
Journal de Montréal/Journal de Québec	Right	-2	Mostly factual	0

The bias scores for each news sources are assigned a numerical value ranging from -2, (right) to 1 (left center) and the factuality score is either 1 (highly factual) or 0 (not highly factual, including sources that are rated both mostly factual and mixed). To assign each participant scores for overall media bias and factuality, the scores for the individual's trusted media outlets will be averaged. For example, if the participant selected National Post, CBC, and Buzzfeed news as news sources trusted to provide reliable information, their media bias score would be

$$\frac{(-1) + 1 + 1}{3} = 0.33 \tag{14}$$

and their media reliability score would be

$$\frac{1 + 1 + 0}{3} = 0.66 \tag{15}$$

These scores suggest that the participant's preferred media sources are slightly left biased (with an average score more than 0) and mostly factual (with a factuality score between 0 and 1).

3.4 Subjective and objective knowledge

In the subjective vs. objective knowledge section, participants were given a list of nine statements about Canadian agriculture: three general statements on agricultural practices in Canada, three statements on organic certification in Canada, and three statements on cell cultured meat (see Appendix 7.2). Participants were asked if they believe the statements are True or False, and their confidence in their answer on a five-point scale from very unconfident to very confident. The order of the questions was randomized for every participant. The number of statements a participant correctly identifies as true or false will serve as the objective knowledge score and the average of the confidence ratings will serve as the subjective knowledge score.

3.5 Information treatments

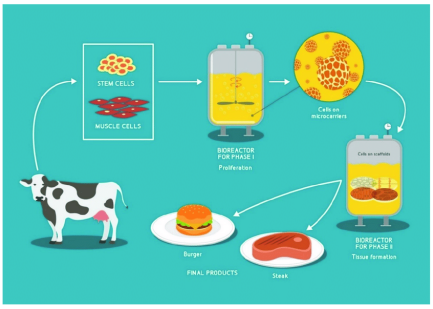
Prior to completing the choice experiment, participants were divided into two groups based on their dietary habits: those who consume beef, and those who do not. Then, participants in each of those groups were randomly divided into four groups: one control group and three information treatment groups. The text of the information treatments is presented in Table 3. The control group received a definition of cell cultured meat, noting its similarity to conventional meat, and a definition of what it means for a food product to be labeled organic. The information treatment groups were given additional information on the environmental benefits, the production process, or animal welfare[3] of both cell cultured meat and organic food, respectively. The additional information on organic food is specific to organic meat in the beef consumer group, and more general to organic food for the non-beef consumer group. While the focus of this research was on cell cultured meat, information on organic production was provided both to compare WTP among meat types, but also so participants remain uncertain regarding the motives

[3] We acknowledge that the portion of the animal welfare treatment regarding organic food for non-beef consumers emphasizes the welfare benefits organic agriculture has on farmers as opposed to livestock, but to be succinct, the term "animal welfare" will be used to refer to this treatment group.

for conducting this research, thus reducing bias. The information treatments are summarized in the following table:

3.5.1 **Table 3:** Full text of the information treatments for beef consumers, and non-beef consumers. The description of cultured meat in all four groups was shown to beef consumers and non-beef consumers. The descriptions of organic meat were shown only to beef consumers, while descriptions of organic food were shown to non-beef consumers.

	Beef consumers	Non-beef consumers
Control	**Cultured meat** Cultured meat is produced from cells from a living animal. These cells are replicated and produce a product that is genetically identical to traditionally raised beef. Cultured meat is cooked exactly like conventional meat, and taste and texture are the same.	
	Organic meat Farms and ranches that raise cattle under the Canadian Organic Standard must undergo periodic inspections by Canadian Food Inspection Agency (CFIA) accredited certification bodies. To be certified organic, farms must meet standards for their cattle's diet and medical treatment. (1)	**Organic Food** Farms that produce crops under the Canadian Organic Standard must undergo periodic inspections by Canadian Food Inspection Agency (CFIA) accredited certification bodies. To be certified organic, farms must meet standards for their pesticide and fertilizer use. (2)
Environment Treatment	**Cultured meat** Cultured meat uses cells from a living animal to make a product that is genetically identical to traditionally raised beef. Cell cultured beef produces significantly less greenhouse gas and uses much less land, water, and energy than conventionally produced beef. (3)	
	Organic meat Organically raised beef is fed a diet of certified organic feed, balanced to meet their nutritional requirements. The environmental benefits of organic agriculture include improved soil biodiversity, reduced risk of groundwater pollution, and sequestered carbon in soil. (4)	**Organic Food** Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health. The environmental benefits of organic agriculture include improving soil biodiversity, reducing the risk of groundwater pollution, and sequestering carbon in the soil. (5)

Production Treatment	**Cultured meat** Cultured meat uses cells from a living animal to make a product that is genetically identical to traditionally raised beef. The cells are taken from muscle tissue and grown in a bio-reactor where they form muscle fibers and larger tissue. The process is outlined in the picture below. (6)  	
	Organic meat Certified organic livestock producers use natural methods of reproduction, and cannot use embryo transfer techniques or genetic engineering or use reproductive hormones. (7)	**Organic Food** To be certified organic, farms must meet standards for their pesticide and fertilizer use. Organic crop production eliminates the use of other synthetic inputs such as such as genetically modified seeds and breeds, preservatives, additives, and irradiation. (8)
Animal welfare	**Cultured meat** Cultured meat uses cells from a living animal to make a product genetically identical to traditionally raised beef. Cells are painlessly taken from the animal and develop into muscle and fat tissue, producing meat without animal slaughter.	
	Organic meat Organic livestock management aims aim to minimize stress and maintain animal health and welfare. Certified organic farms must provide livestock with access to pasture during the grazing season and access to the open air at other times whenever weather conditions permit. (9)	**Organic Food** Certified organic farms must meet standards for their pesticide and fertilizer use. Organic farms can increase food production by managing local resources without having to rely on external inputs or food distribution systems, improving local food security. (10)

1 Government of Canada (2021). *Regulating organic products in Canada*. Retrieved from https://inspection.canada.ca/organic-products/regulating/eng/1328082717777/1328082783032

2 Government of Canada (2021). *Regulating organic products in Canada*. Retrieved from https://inspection.canada.ca/organic-products/regulating/eng/1328082717777/1328082783032

3 Tuomisto, H. L., & Teixeira de Mattos, M. J. (2011). Environmental impacts of cultured meat production. *Environmental science & technology, 45*(14), 6117-6123.

4 Organic Agriculture FAQ: What are the environmental benefits of organic agriculture? Food and Agriculture Organization of the United Nations https://www.fao.org/organicag/oa-faq/oa-faq6/en/

5 Organic Agriculture FAQ: What are the environmental benefits of organic agriculture? Food and Agriculture Organization of the United Nations https://www.fao.org/organicag/oa-faq/oa-faq6/en/

6 Djisalov, M., Knežić, T., Podunavac, I., Živojević, K., Radonic, V., Knežević, N. Ž., . . . Gadjanski, I. (2021). Cultivating multidisciplinarity: Manufacturing and sensing challenges in cultured meat production. *Biology, 10*(3), 204.

7 Government of Canada (2020b). *Organic production systems: General principles and management standards*. Gatineau, Canada K1A 0S5: Canadian General Standards Board Retrieved from

https://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/032-310/032-310-eng.html

8 Organic Agriculture FAQ: What is organic agriculture? Food and Agriculture Organization of the United Nations https://www.fao.org/organicag/oa-faq/oa-faq1/en/

9 Government of Canada (2020b). *Organic production systems: General principles and management standards*. Gatineau, Canada K1A 0S5: Canadian General Standards Board Retrieved from https://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/032-310/032-310-eng.html

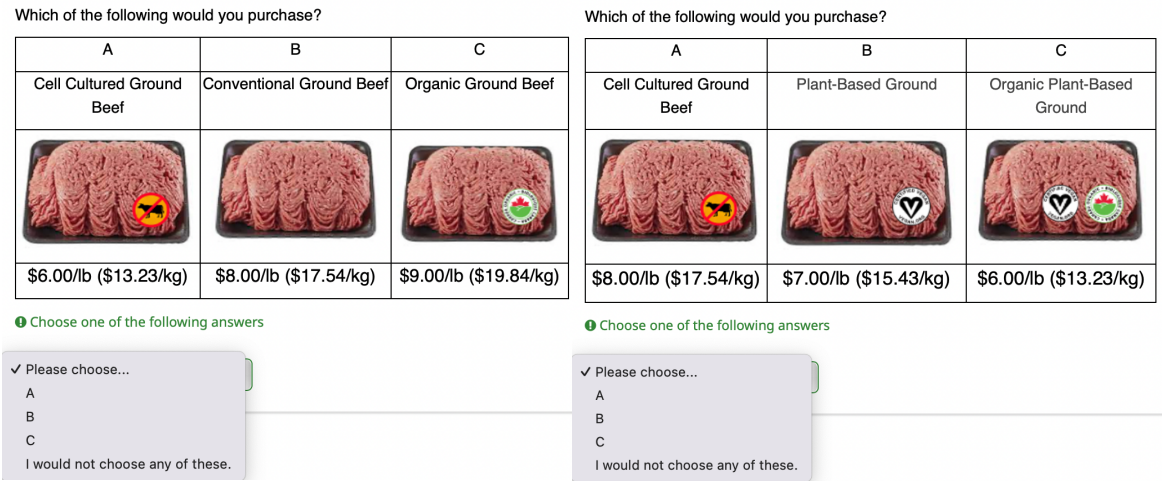
10 Government of Canada (2020b). *Organic production systems: General principles and management standards*. Gatineau, Canada K1A 0S5: Canadian General Standards Board Retrieved from https://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/032-310/032-310-eng.html

3.6 Discrete choice questions

After reading the information provided, participants were given four hypothetical discrete choice questions, asking to choose amongst different products that vary by type (i.e., cell-cultured, organic, or conventionally produced) and price. All three types were shown in every question, labeled as options A, B, and C. Participants were able to choose A, B, C or "I would not choose any of these". Beef consumers selected between cell cultured ground beef, conventional ground beef, and organic ground beef, and consumers that do not consume beef selected between cell cultured ground beef, plant-based ground, and organic plant-based ground.

The prices ranged from $6.00/lb to $9.00/lb (presented in both $/lb and $/kg), which were representative of the lower end of traditional and plant-based beef prices from the Provigo and Metro websites in Montreal, Quebec based on data collected on Nov 21st, 2022 and Feb 8th, 2023 (see appendix 7.3). Due to the high range in beef prices between different types of beef available in grocery stores (traditional, organic, plant-based, plant-based organic), and price variability overtime, especially at the time of data collection, we chose to have the lowest price represent the lowest price recorded at the grocery store, and increase in $1.00/lb intervals to reduce the number of participants always selecting the cheapest option, or not making a choice. The four possible prices $6.00/lb, $7.00/lb, $8.00/lb and $9.00/lb all appeared an equal number of times across all questions in all treatments. N-gene was used to generate a fractional factorial design, where a subset of the total attribute and price combinations were chosen as to expose information about the most important features of the problem studied, while using a fraction of the experimental runs and resources of a full factorial design. Examples of choice questions presented to both groups are presented in Figure 1 below.

3.6.1 **Figure 1:** Sample choice question given to participants that consume beef (left) and participants that do not consume beef (right)



3.7 Debrief

The last section of the survey is the debrief, in which participants shared their willingness to try and purchase cell cultured meat, as well as their trust in the Canadian Food Inspection Agency (CFIA) to provide a reliable and safe food supply. Additionally, they ranked the decision factors for making meat purchases from most to least important. The final question is a box for participants to share any additional thoughts or comments about cell cultured meat.

4 Results

Participants completed the online survey from April 21 – June 2, 2023. The average survey time was 8 minutes and 54 seconds. A total of 199 Canadian adults completed the survey. The sample skews towards English speakers, men, young adults, and more educated individuals compared to the greater Canadian population.

4.1 Summary statistics

Participants from all ten provinces and one of the three territories participated in this study. As demonstrated by Table 4, which presents the province of residence for participants in this study and the population of Canada from the 2022 census, the survey sample demonstrates representation of the Canadian population by province, except for Quebec, which exhibits underrepresentation, and Ontario, which exhibits overrepresentation. Additionally, no participants from Nunavut or Yukon completed the survey.

4.1.1 **Table 4:** Province of residence of study participants and comparison to the Canadian population

	% of sample	Proportion census (Statistics Canada, 2022b)
Alberta	12.63%	11.71%
British Columbia	16.16%	13.66%
Manitoba	4.55%	3.61%
New Brunswick	2.53%	2.09%
Newfoundland and Labrador	0.51%	1.35%
Northwest Territories	0.51%	0.12%
Nova Scotia	4.04%	2.62%
Ontario	44.44%	38.84%
Prince Edward Island	0.51%	0.44%
Quebec	13.13%	22.27%
Saskatchewan	1.01%	3.07%
Nunavut	0.00%	0.10%
Yukon	0.00%	0.11%

Table 5 presents the gender identities of participants in our sample. Over half of our study sample identified as men, which is higher than the proportion of the Canadian population. More than 41% identified as women, while roughly 2% identified as non-binary and just 1% of our sample did not state their gender. The Canadian census finds 49.28% of the population identify

as men, and 50.67% identify as women, while 55.78% of our sample identifies as men, and 41.7 identify as women (Statistics Canada, 2022d).

4.1.2 **Table 5:** Gender of study participants and comparison to the Canadian population

	% of sample	Proportion census (Statistics Canada, 2022d)
He/Him	55.78%	49.28%
She/Her	41.71%	50.67%
They/Them or Other	2.02%	N/A
Prefer not to say	1.01%	N/A

According to the 2021 Canadian census, 75.5% of residents spoke English, 21.4% spoke French, and 18.0% spoke both English and French (Statistics Canada, 2022f). In our survey, 94.47% of participants spoke English at home, 7.54% spoke French at home, and 3.52% spoke both English and French at home, as seen in Table 6.

4.1.3 **Table 6:** Primary language spoken at home of study participants and comparison to the Canadian population

	% of sample	Proportion census* (Statistics Canada, 2022f)
English	94.47%	75.5%
French	7.54%	21.4%
English and French	3.52%	18.0%

*The Canadian census asks what languages individuals speak, but not necessarily at home.

The survey was available for completion in either English or French. 96.98% of participants chose to complete the survey in English, and 3.02% of participants chose to complete it in French. The underrepresentation of French speakers may be due to the MTurk only allowing one language as the task title. Participants preferring French would have to select the task, and change the survey language to French on the survey start page.

Age categories of our sample are shown in Table 7. The sample underrepresents older Canadians. The Canadian census median age is 41.0 years old, while the sample median age is 34 years old (Statistics Canada, 2022d).

4.1.4 **Table 7:** Age of study participants and comparison to the Canadian population

Age range	% of sample	Proportion census (Statistics Canada, 2022d)
18-24	10.55%	10.76%
25-44	68.34%	34.10%
45-64	19.10%	31.95%
65+	2.01%	23.19%

.

As shown in Table 8, the median highest education level achieved of our sample was a Bachelor's degree, with participants of ages raging from 19 to 71, and the median highest education level achieved of Canadians according to the census from ages 25 to 64 was College, CEGEP, or trades certificate/diploma, with 36.3% of the population (Statistics Canada, 2022a).

4.1.5 **Table 8:** Education level of study participants and comparison to the Canadian population

	% of sample	Proportion census ages 25-64 (Statistics Canada, 2022a)
Less than high school	1.52%	11.5%
High school diploma	16.16%	23.7%
College, CEGEP, or trades certificate/diploma	18.18%	36.3%
Bachelor's degree	44.95%	28.5%
Master's degree	16.16%	
Doctoral or professional degree	3.03%	

As shown in Table 9, the survey sample demonstrates representation of the Canadian population by race, with representation of all major minority groups recognized on the Canadian census (Statistics Canada, 2022e).

4.1.6 **Table 9:** Race of study participants and comparison to the Canadian population

	% of sample	Proportion Canadian population (Statistics Canada, 2022e)
Black	4.02%	4.16%
East Asian	10.55%	4.96%
Indigenous (First Nations, Inuk/Inuit, Métis)	4.52%	4.87%
Latin American	3.52%	1.73%
Middle Eastern	3.02%	2.02%
South Asian	6.03%	7.47%
Southeast Asian	5.03%	3.77%
White	65.83%	73.34%
Prefer not to say	2.51%	N/A
Other	0.00%	0.75%

In 2021, the median after-tax income for Canadian families and individuals not living in families was $68,400 CAD, and our sample median after-tax household income was between $50,000-$100,000 CAD, as shown in Table 10 (Statistics Canada, 2023).

4.1.7 **Table 10:** Income of study participants

	% of sample
Under 50,000	19.10%
50,000-100,000	41.21%
100,000-250,000	32.16%
250,000-500,000	2.01%
500,000+	0.50%
Prefer not to say	5.03%

Table 11 shows our sample skews more liberal than conservative, with approximately 20% of our sample identifying as conservative, 41% as liberal, and 38% as neither conservative nor liberal. The median political affiliation of our sample is neither conservative nor liberal.

4.1.8 **Table 11:** Political affiliation of study participants

	% of sample
Strongly conservative	2.02%
Conservative	18.18%
Neither conservative nor liberal	38.38%
Liberal	31.82%
Strongly liberal	9.60%

Participants were asked whether they had any dietary preferences or restrictions. These results are presented in Table 12. The dietary habits of our sample are in line with previous data collected on Canadians, such as Vergeer, Vanderlee, White, Rynard, and Hammond (2020), who found 13.6% of Canadian youth and young adults adopting a vegan, vegetarian, or pescatarian diet (n=2566). Similarly, in our research 12.1% of participants indicated they were vegan, vegetarian, or pescatarian, and 15.1% of participants selected vegan, vegetarian, or pescatarian *or* never consume beef. The latter is used to distinguish beef consumers from participants that do not consume beef for the information treatments and subsequent choice experiment. Our original intent was to compute mixed logit regressions for beef consumers and non-beef consumers separately to see how these two groups they differ in their response to additional information,

however since only 30 participants in our study did not consume beef, we chose to exclude them from the mixed logit WTP and willingness to choose.

4.1.9 **Table 12:** Dietary restrictions, preferences, and habits of study participants compared to Vergeer et al. (2020)

	% of sample	Results from (Vergeer et al., 2020)
Vegetarian	7.54%	6.6%
Vegan/plant-based	2.51%	2.5%
Pescatarian	2.01%	4.5%
Food intolerance/allergy	11.56%	86.4%
Religious dietary restrictions/requirements	7.54%	
I do not have any dietary restrictions	72.86%	

Participants were presented with 8 randomized statements on food neophobia and food technology neophobia, henceforth referred to as technophobia. All neophobia and technophobia statements presented in the survey are listed in Appendix 7.1. An example of a neophobia statement is "I am constantly sampling new and different foods", and an example of a technophobia statement is "The media usually give correct impartial news on new food technologies". Participants were then asked to indicate their sentiment towards the statements using a 1 to 5 scale, 1 indicating "Strongly Agree" to 5 indicating "Strongly Disagree". The 1-5 values are averaged in the table below, so that 1 indicates low neophobia/technophobia, and 5 indicates high neophobia/technophobia. Mean neophobia and technophobia scales are shown in Table 13.

4.1.10 **Table 13:** Average mean food neophobia and technophobia scores of study participants. Individual scale items were captured on a scale of 1 to 5, where 1 indicates low neophobia/technophobia, and 5 indicates high neophobia/technophobia.

	Mean neophobia and technophobia values	95% confidence interval
Food neophobia scale	2.56	2.443 - 2.678
Food technophobia scale	3.02	2.920 - 3.118

Participants' main source of news is presented in Table 14. Most participants in our sample consume the majority of their news from news websites at 40.70%, followed by social media at 36.18%. The remaining 23.12% of the sample consume the majority of their news from television, radio, printed newspaper or magazine, or other sources.

4.1.11 **Table 14:** Main source of news of study participants

	% of sample
News websites	40.70%
Social Media	36.18%
Television	15.58%
Radio	4.02%
Printed newspaper or magazine	0.50%
Other	3.02%

Participants were presented with a list of 14 mainstream Canadian news organizations of which 10 were predominantly English, and 4 were predominately French. Participants were then asked "Which of the following sources (print, radio, or online) do you trust to provide reliable news information"? Results are presented in Table 15. 17.09% of participants said they did not trust any news sources listed, and 2.01% of participants said they are unfamiliar with all news sources listed. For participants selecting at least one news source, the average number of news sources selected was 3.59. As shown in Table 15, The CBC is the most trusted news source of the options listed, with almost 2/3 of participants indicating they trusted the CBC to provide reliable news. This was followed by CTV News (51.26%) and the Globe and Mail (40.20%).

4.1.12 **Table 15:** Mainstream Canadian news organizations study participants trust to provide reliable news information

	% of sample
CBC	64.82%
CTV News	51.26%
The Globe and Mail	40.20%
Global News	38.19%
National Post	25.13%
Toronto Sun	14.57%
Vice News	9.55%
La Presse	7.04%
Le Devoir	6.03%
TVA Nouvelles	4.52%
Buzzfeed News	3.02%
Rebel News	3.02%
The Tyee	2.01%
Journal de Montréal/Journal de Québec	2.01%
I do not trust any of these news sources	17.09%
I am not familiar with any of these news sources	2.01%

To produce a quantitative objective and subjective knowledge score, participants were given a list of nine statements about Canadian agriculture: three general statements on agricultural practices in Canada, three statements on organic certification in Canada, and three statements on cell cultured meat. Participants were asked if they believe the statements are True or False, and their confidence in their answer on a five-point scale from very unconfident to very confident. The order of the questions was randomized for every participant. The number of statements a participant correctly identifies as True or False will serve as the objective knowledge score and the average of the confidence ratings will serve as the subjective knowledge score. The full list of statements is listed in Appendix 7.2. Summary scores are presented in Table 16. Participants who had the highest objective knowledge score for the cell cultured meat statements, but the highest subjective knowledge score for the general agriculture statements. The correlation between the average true/false score and the average reported confidence is 0.03, suggesting a very weak positive linear relationship between subjective and objective knowledge.

4.1.13 **Table 16:** Subjective vs. objective knowledge: study participants' response to true/false statements and reported confidence.

	% Correct response*	Average reported confidence (1-5)**
Organic animal agriculture statements	53.32%	2.96
General animal agriculture statements	52.76%	3.15
Cell cultured meat statements	71.19%	2.60
Total mean of 9 statements, 3 from each category above	59.09%	2.90

*If a participant left a true/false question unanswered, it is considered incorrect.
** If a participant did not give a confidence score, they are excluded from the average. Average confidence is measured on a scale ranging from 1 = not at all confident to 5 = very confident.

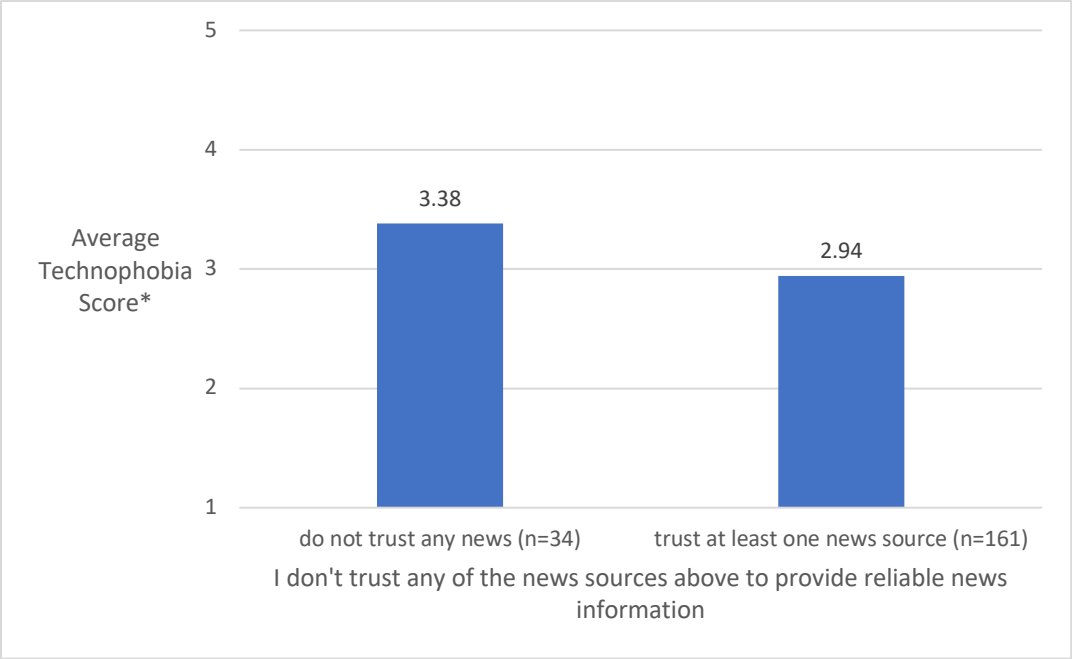
Table 17 shows participants' response to the question "How willing would you be to purchase cell cultured meat if the price and taste were the same as conventional meat"? The mean value is 3.328, and the median value is 4.

4.1.14 **Table 17:** Willingness to purchase cell cultured meat

	% of sample
1 = not at all willing	18.18%
2	15.15%
3	15.15%
4	18.69%
5= very willing	32.83%

Approximately 17% of our sample did not trust any of any of the 14 mainstream Canadian news sources listed in Table 2 to provide reliable news information. The average technophobia scores are significantly different from one another at the 1% significance level using a ttest. This finding indicates participants with high technophobia are more likely to not trust any of the news sources listed in the survey.

4.1.14 **Figure 2:** Average technophobia score by trust in mainstream new sources. The average technophobia score measures participants' technophobia based on agreement/disagreement to 4 technophobia statements on a 1 to 5 scale. 1 indicates low technophobia, and 5 indicates high technophobia.

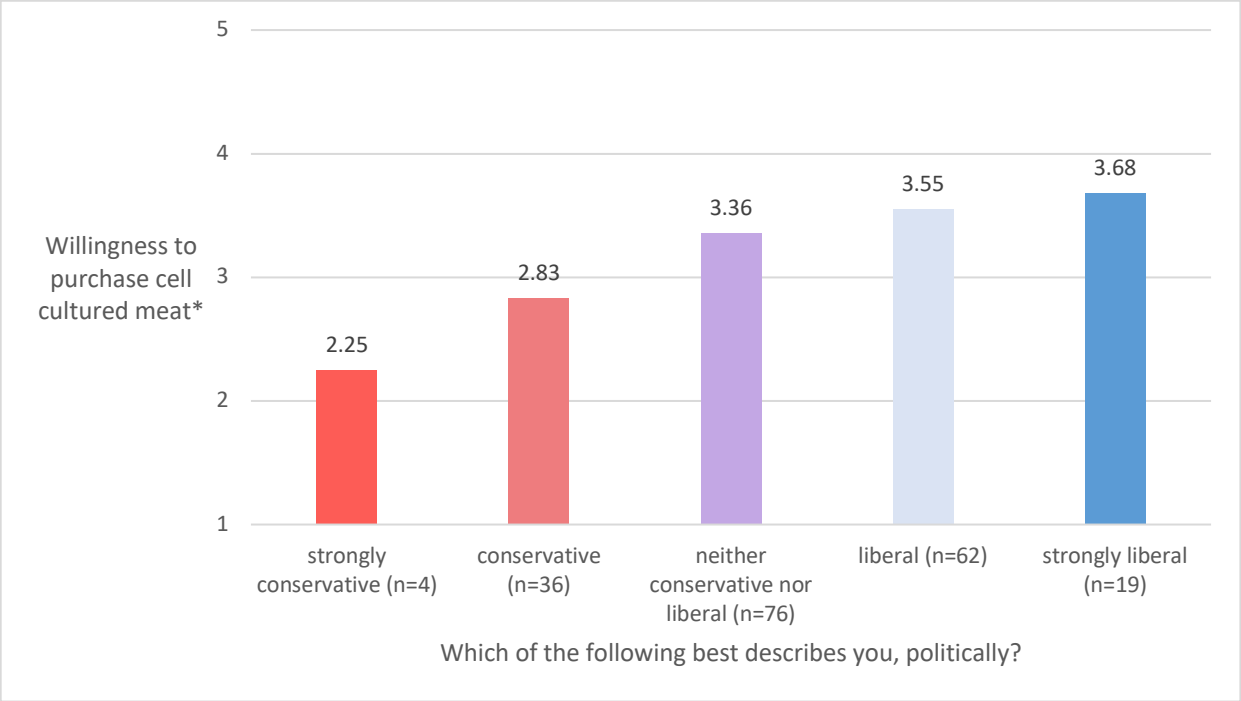


As shown in Table 11, approximately 20% of our sample is conservative, 41% is liberal, and 38% is neither conservative nor liberal. This finding indicates a political aspect towards willingness to purchase cell cultured meat. Participants that identify as liberal are more likely to purchase cell cultured meat than those who identify as conservative.

A one-way ANOVA test indicates there are differences in the 5 political leanings at the 10% significance level (Prob>F 0.081), with an R-squared value of 0.042

A chi2 test where "strongly conservative" is grouped with "conservative", "strongly liberal" is grouped with "liberal", and "neither conservative not liberal" is excluded, the Chi2 values are: Pearson chi2(4) = 11.775 Pr = 0.019

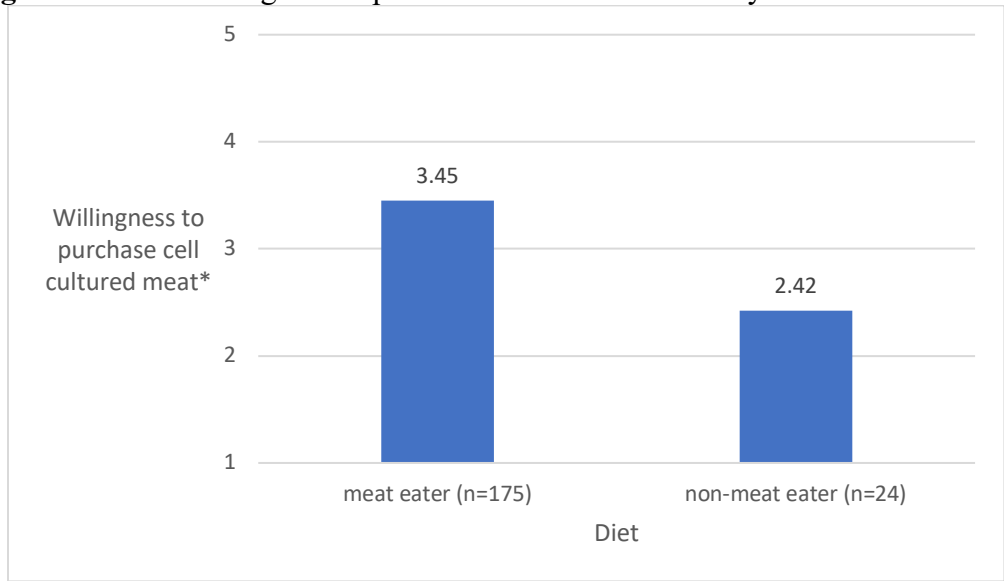
4.1.15 **Figure 3:** Mean willingness to purchase cell cultured meat by political affiliation



*Participants were asked "How willing would you be to purchase cell cultured meat if the price and taste were the same as conventional meat"? 1 = not at all willing, 5 = very willing

Our sample is approximately 88% meat eaters, and 12% vegan, vegetarian, or pescatarian. The average technophobia scores are significantly different from one another at the 1% significance level using a ttest. This finding indicates meat eaters are more likely to purchase cell cultured meat than non-meat eaters, i.e., vegans, vegetarians, and pescatarians.

4.1.16 **Figure 4:** Mean willingness to purchase cell cultured meat by diet

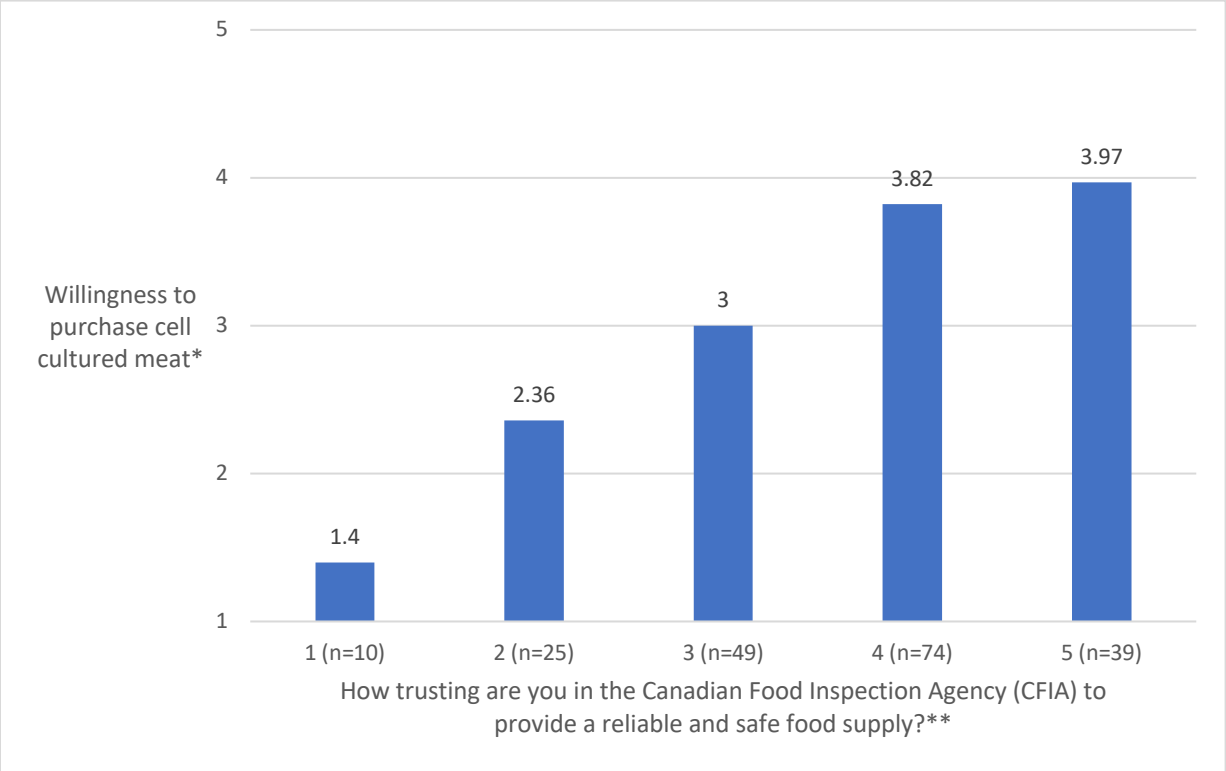


*Participants were asked "How willing would you be to purchase cell cultured meat if the price and taste were the same as conventional meat"? 1 = not at all willing, 5 = very willing

There is a strong correlation between trust in the CFIA and willingness to purchase cell cultured meat. A one-way ANOVA test indicates there are significant differences in the 5 levels of trust in the CFIA at the 1% significance level (Prob>F 0.000), with an R-squared value of 0.226

A chi2 test is also significant at the 1% level: Pearson chi2(16) = 70.960 Pr = 0.000

4.1.17 **Figure 5:** Mean willingness to purchase cell cultured meat by trust in the Canadian Food Inspection Agency (CFIA)



*Participants were asked "How willing would you be to purchase cell cultured meat if the price and taste were the same as conventional meat"? 1 = not at all willing, 5 = very willing
**1 = Not at all trusting, 5 = very trusting

4.2 Mixed Logit Results

Table 18 describes the variables included in the mixed logit model in Table 19, which estimates the probability of choosing different cell cultured and organic ground beef compared to conventional ground beef, regardless of information treatment group.

A mixed logit regression is appropriate for estimating the impact of these variables on the probability of choosing as it allows us to determine other possible factors influencing consumer's choice include demographic characteristics (e.g., age, income, gender, and education, political beliefs), media bias and reliability, subjective and objective knowledge on Canadian agriculture and cell cultured meat, and consumers' attitudes towards new foods and technology. This set of M characteristics of individual n that influence the mean of the taste parameters are represented as by $\boldsymbol{z_n}$ in Equation 8.

Since only 30 participants in our study did not consume beef, as indicated in Table 12, we chose to exclude them from the mixed logit WTP and willingness to choose in Tables 19-21.

4.2.1 **Table 18:** Description of variables included in mixed logit regression to estimate probability of choosing different meat types

male	Binary variable = 1 for participants who go by he/him pronouns, 0 otherwise
main news social media	Binary variable = 1 for participants whose main source of news is social media, 0 otherwise.
average technophobia	This continuous variable measures participants' average technophobia based on 4 technophobia questions listed in Appendix 7.1 on a 1 to 5 scale. 1 indicates low technophobia, and 5 indicates high technophobia.
average neophobia	This continuous variable measures participants' average neophobia based on 4 neophobia questions listed in Appendix 7.1 on a 1 to 5 scale. 1 indicates low neophobia, and 5 indicates high neophobia.
average true/false score	This continuous variable measures participants' average score on the nine true/false questions listed in Appendix 7.2. Participants are excluded if less than 7 out of 9 questions were answered.
average confidence	This continuous variable measures participants' average confidence score on the nine true/false questions listed in Appendix 7.2. Participants are excluded if less than 7 out of 9 questions were answered.
average bias trustful	This continuous variable measures participants' average bias score, which is calculated by averaging the values as exemplified in Equation 13. Values range from -2 to 1 as shown in Table 2.
average reliability trustful	This continuous variable measures participants' average reliability score, which is are calculated by averaging the values as exemplified in Equation 14. Values range from 0 to 1 as shown in Table 2.
total news sources trustful	This numeric variable measures the total number of news sources selected from a list of 14 mainstream Canadian news outlets listed in Table 2, for participants that trust at least one of the news sources listed.
do not trust any news	This binary variable = 1 for participants that did not trust any of the news sources presented, 0 otherwise.

Table 19 presents beef consumers' estimated coefficients of cell cultured and organic ground beef, or not making a choice, compared to conventional ground beef, taking into consideration demographic characteristics, media bias, reliability and trust, technophobia and neophobia, and subjective vs. objective knowledge.

Since 31 participants who consume beef indicated that they did not trust any of the 14 news sources presented, they are excluded from the bias and reliability, and total news sources variables, named "average bias trustful," "average reliability trustful," and "total news sources trustful" respectively in columns 1-3. Though, participants that did not trust any of the news sources presented are captured in columns 3-6 with the binary variable "do not trust any news".

Participants that are men and use social media as a main news source are more likely to choose the cell cultured ground beef over conventional ground beef. Additionally, trusting news from more news sources, low technophobia, high objective knowledge, and low subjective knowledge are associated with higher probability of choosing cell cultured ground beef over conventional ground beef. Further, high objective knowledge, and consuming more liberal news sources is associated with choosing organic ground beef over conventional ground beef. Finally, high neophobia, and low confidence is associated with an increased likelihood of not choosing any of the ground beef options over conventional ground beef. Surprisingly, participants' neophobia score is not associated with a higher probability of choosing cell cultured ground beef or organic ground beef over conventional ground beef, nor if they did not trust any of the news sources presented in the survey.

4.2.2 **Table 19:** Coefficients from mixed logit model to estimate the probability of choosing, all treatments

Trusting participants only (left, 1-3), and all participants (right, 4-6), with conventional meat as baseline, beef consumers only. Conventionally produced beef is the base category.

	Trust at least one news source			Do not trust any news sources		
	cell cultured	no choice	organic	cell cultured	no choice	organic
price		-1.421***			-1.361***	
		(0.167)			(0.139)	
sd(price)		0.969***			0.961***	
		(0.163)			(0.140)	
male	1.286***	29.272	0.200	1.011***	7.663	0.311
	(0.456)	(1,142.618)	(0.296)	(0.385)	(4.970)	(0.251)
main news social media	1.066**	-4.909	-0.235	0.454	-2.020	-0.326
	(0.473)	(17.704)	(0.314)	(0.384)	(3.528)	(0.257)
average technophobia	-1.760***	1.241	0.367	-1.706***	-1.472	0.236
	(0.359)	(6.596)	(0.225)	(0.305)	(2.356)	(0.192)
average neophobia	-0.428	5.367	-0.072	-0.257	3.227*	-0.050
	(0.288)	(7.893)	(0.199)	(0.241)	(1.796)	(0.167)
average true/false score	4.271***	14.815	1.592*	4.898***	14.854	0.987
	(1.360)	(62.174)	(0.946)	(1.190)	(10.346)	(0.805)
average confidence	-0.616**	-12.435*	-0.028	-0.216	-3.647*	-0.100
	(0.300)	(6.666)	(0.219)	(0.256)	(2.049)	(0.177)
average bias trustful	0.475	68.358	0.492*			
	(0.437)	(44.277)	(0.284)			
average reliability trustful	2.591*	166.572	0.132			
	(1.392)	(20,417.655)	(0.809)			
total news sources trustful	0.237**	5.812	0.085			
	(0.102)	(5.868)	(0.081)			
do not trust any news				-0.680	0.145	-0.532
				(0.518)	(4.181)	(0.331)
constant	-0.287	-283.792	-1.613	1.337	-31.567**	-0.275
	(1.988)	(20,456.048)	(1.340)	(1.402)	(13.584)	(0.976)
Log likelihood		-343.194			-447.379	
Observations		2,064			2,544	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 20 shows the results from the mixed logit estimations. The first column estimates willingness to pay for cell cultured ground beef and organic ground beef relative to conventional ground beef as the baseline, not considering information treatments. Participants that consume beef are willing to pay a premium of $0.59 CAD for organic ground beef, and $1.15 CAD less for cell cultured ground beef compared to conventional ground beef.

The second column estimates willingness to pay for cell cultured ground beef and organic ground beef compared to conventional ground beef at the baseline, accounting for information treatments, with the control treatment as the baseline. Participants in the control group that consume beef are willing to pay a premium of $0.75 CAD for organic ground beef, and $0.89 CAD less for cell cultured ground beef compared to conventional ground beef. None of the information treatments had an impact on willingness to pay for cell cultured ground beef, though the environment treatment decreased the willingness to pay for organic ground beef by $0.66 CAD compared to the control group.

4.2.3 **Table 20:** Results from mixed logit regression for willingness to pay, with and without information treatments, beef consumers only

	Mixed logit coefficients	WTP (CAD)	Mixed logit coefficients	WTP (CAD)
organic	0.452***	$0.59	0.592***	$0.75
	(0.101)		(0.211)	
cell cultured	-0.887***	-$1.15	-0.702***	-$0.89
	(0.132)		(0.251)	
price	-0.769***		-0.791***	
	(0.053)		(0.067)	
ASC	-8.682***		-8.810***	
	(0.500)		(0.598)	
environment group * cell cultured			-0.460	
			(0.356)	
process group * cell cultured			-0.697	
			(0.428)	
welfare group * cell cultured			0.448	
			(0.378)	
environment group * organic			-0.518*	-$0.66
			(0.274)	
process group * organic			-0.069	
			(0.342)	
welfare group * organic			0.345	
			(0.325)	
Log likelihood	-578.890		-569.418	
Observations	2,704		2,704	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 21 estimates willingness to pay for beef consumers, interacted with both the information treatments, and technophobia, using a mixed logit model. Technophobia is measured on a 1 to 5 scale, 1 being not at all technophobic, and 5 being highly technophobic. We created a binary variable that divides participants at the median technophobia score to indicate participants as having either high or low technophobia. Participants that had an average technophobia score of ≥ 3 are labeled "high technophobia" and assigned a value of 1 for this variable. The baseline in this regression is the control group, and participants with low technophobia, with an average technophobia score of <3.

The first portion of the table indicates the coefficient on organic is still positive and significant, however the coefficient on cell cultured is insignificant, indicating participants in the control group with low technophobia have the same WTP for cell cultured ground beef as conventional ground beef.

The second portion of the table shows participants in the control group with high technophobia have lower WTP for cell cultured ground beef than for conventional ground beef by $1.10 CAD. Further, participants in the production process group with high technophobia have lower WTP for cell cultured ground beef than for conventional ground beef by $3.95 CAD.

The third portion of the table shows participants in the environment group with low technophobia have lower WTP for organic ground beef than for conventional ground beef by $1.08 CAD. Further, participants in the production process group with high technophobia have lower WTP for organic ground beef than for conventional ground beef by $2.32 CAD. Additionally, participants in the welfare group with high technophobia have higher WTP for organic ground beef than for conventional ground beef by $1.59 CAD.

4.2.4 **Table 21:** Results from mixed logit regression for willingness to pay, with information treatments, separated by high and low technophobia, beef consumers only

	Mixed Logit Coefficients	WTP (CAD)
organic	0.767*	$0.93
	(0.399)	
cell cultured	-0.138	
	(0.434)	
price	-0.824***	
	(0.069)	
asc	-9.068***	
	(0.617)	
cell cultured * high technophobia	-0.910*	-$1.10
	(0.512)	
cell cultured * environment group	-0.511	
	(0.543)	
cell cultured * environment group * high technophobia	-0.308	
	(0.754)	
cell cultured * process group	1.441	
	(1.145)	
cell cultured * process group * high technophobia	-3.254**	-$3.95
	(1.288)	
cell cultured * welfare group	0.050	
	(0.559)	
cell cultured * welfare group * high technophobia	0.552	
	(0.724)	
organic * high technophobia	-0.265	
	(0.464)	
organic * environment group	-0.889*	-$1.08
	(0.475)	
organic * environment group * high technophobia	0.650	
	(0.565)	
organic * process group	1.512	
	(1.094)	
organic * process group * high technophobia	-1.910*	-$2.32
	(1.156)	
organic * welfare group	-0.388	
	(0.533)	
organic * welfare group * high technophobia	1.312**	$1.59
	(0.664)	
Log likelihood	-548.255	
Observations	2,704	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5 Discussion

Table 19 shows men are significantly more likely to choose cell cultured ground beef over conventional ground beef compared to women, which is in alignment with the findings of other researchers (Slade, 2018). Additionally, Figure 3 shows that people who are politically conservative are less likely to report that they would be willing to purchase cell cultured meat than those who are more politically liberal, and Figure 4 shows meat eaters have higher willingness to purchase cell cultured meat than vegans, vegetarians, and pescatarians, which is in alignment with a systematic review by Bryant and Barnett (2018).

Table 19 also indicates participants with high technophobia are significantly less likely to choose cell cultured ground beef over conventional ground beef. These findings support the results of Heidmeier and Teuber (2023), who also referenced the work of by Cox and Evans (2008) on food technology neophobia, similar to this study. In contrast, our findings contradict those of Gómez-Luciano et al. (2019) who found food technology neophobia had no effect on willingness to purchase cultured meat among participants from the United Kingdom, Spain, Brazil, and the Dominican Republic. Additionally, we do not find that food neophobia is an indicator for willingness to choose cell cultured meat. Though, participants with high food neophobia are more likely to not choose any ground beef product. This finding differs from that of Wilks et al. (2019), who also referenced the work Pliner and Hobden (1992) on food neophobia, finding those with lower levels of food neophobia were more willing to eat cultured meat.

Furthermore, our findings in Table 19 indicate participants with high objective knowledge (average true/false score), and those with low subjective knowledge (average confidence) are more likely to choose cell cultured ground beef; participants with high objective knowledge are also more likely to choose organic ground beef. Though, it appears objective knowledge drives decision-making, which contradicts findings by Peschel et al. (2016), who conclude subjective knowledge to be more important than objective knowledge in predicting environmentally friendly choice behaviour. Similarly, our findings contradict Pieniak et al. (2010), which conclude subjective knowledge has a significant, strong and direct impact on organic vegetable consumption, while objective knowledge has only an indirect effect, as it influences subjective knowledge and positive attitudes towards organic vegetables.

Also, columns 1-3 of Table 19 show that participants that are trusting of a higher number of mainstream news outlets are more likely to choose cell cultured meat over conventional meat. Further, participants that trust at least one news source, and trust more left-leaning news sources are more likely to choose organic ground beef over conventional ground beef compared to participants that trust more right-leaning news sources. Also, out of the participants that trust at least one news source, those that trust more reliable news sources are more likely to choose cell cultured ground beef over conventional ground beef. Finally, participants that get most of their news from social media are more likely to choose cell cultured ground beef over conventional ground beef if they trust at least one mainstream news source.

Interestingly, columns 4-6 of Table 19, which includes a binary variable for participants that do not trust any of the 14 mainstream Canadian news sources listed in the survey, appears to indicate a lack of trust in mainstream news has no effect on their probability of choosing or not choosing a particular beef type. Though, technophobia is highly negatively correlated with willingness to choose cell cultured meat, as seen in Table 19, and participants that do not trust any of the news sources have higher technophobia scores as seen in Figure 2. Therefore, not trusting any news sources could be indirectly influencing willingness to choose cell cultured ground beef through technophobia. Jointly, these findings suggest the reliability of mainstream news sources has a direct effect, and the lack of trust in all mainstream news sources has an indirect effect through technophobia, on the willingness to choose cell cultured ground beef.

The findings from the mixed logit model presented in Table 20 show that participants are willing to pay $1.15 less for cell cultured ground beef compared to conventional ground beef, supporting the idea that Canadian consumers will purchase cell cultured ground beef in grocery stores if it costs less than conventional meat. This highlights a possible hurdle cell cultured meat companies will face if they want to compete with conventional meat for market share. Cell cultured meat companies will need to use economies of scale to lower the cost of production. Garrison, Biermacher, and Brorsen (2022) find that as of 2022, the wholesale cost of cell cultured meat is optimistically projected to be as low as $63/kg USD. For comparison, the average price of conventional ground beef in Canadian grocery stores from data we collected on

February 8, 2023 (see Appendix 7.3) was $10.44/kg when converted to USD, and our hypothetical choice experiment had a maximum price of approximately $14.84/kg when converted to USD, or about 1/4th of the estimated cost. And still, Table 20 shows a negative WTP for cell cultured ground beef. Also, out of the participants that left additional comments after the survey, 21.29% of the comments mentioned the cost of cell cultured meat, sharing sentiments such as "meat alternatives should be cheaper than real meat" and "Make these more sustainable options more financially viable. Stop trying to save the planet at the expense of the consumer." Therefore, cell cultured meat will have to compete as a niche product until technology advances, and production expands.

Additionally, the findings from the mixed logit model from Table 20 with information treatment variables indicate that without controlling for consumer demographics, providing additional information on the production process, environmental benefits, or animal welfare benefits has no statistically significant impact on increasing or decreasing the WTP for cell cultured ground beef. However, participants in the environment group had lower WTP for organic ground beef over conventional ground beef compared to the control group. Perhaps there is the boomerang effect at play, where participants choose the opposite of what the information treatment is saying because of how it is presented to them. Byrne and Hart (2009) believe that one of the most serious implications of this effect is that messages with a pro-social intent can result in the targeted attitude or behaviour becoming worse. For instance, suburban children who participated in public health campaigns like Drug Abuse Resistance education, or "D.A.R.E" use drugs significantly more through high school than all urban participants, and the suburban control group (Byrne & Hart, 2009).

Jointly, these findings suggest people's perception of the taste and texture of cell cultured ground beef are not necessarily the driving factors for why participants have a negative WTP for cell cultured ground beef, but rather idea of meat being produced in a novel, complex way that is jarring to some consumers. As one participant noted at the end of the survey, "I don't understand why fake meat is so important. If you don't want/need to eat meat, don't eat it. This is entirely unnecessary and further divorcing us from natural connection to our food." This possibility is further explored in Table 21, which is like Table 20, but with the meat types interacted with both

the information treatments and technophobia. Our findings show participants in the production process group with high technophobia are willing to pay $3.95 less for cell cultured ground beef. Also, participants with low technophobia in the control group have no significantly different WTP for cell cultured ground beef compared to conventional ground beef. It is also worth mentioning that participants in the control group in addition to a basic definition of cell cultured meat were told that the taste and texture of cell cultured meat are the same as conventional meat, highlighting the similarity between the two products. Therefore, our findings are in alignment with previous literature that suggest framing cell cultured meat as a technological innovation is unappealing (Bryant & Barnett, 2018; Bryant & Dillard, 2019; Dupont et al., 2022; Tomiyama et al., 2020). However, we can provide some nuance to this assertion. Framing cell cultured meat as a technical innovation is unappealing to consumers, but our results suggest that this is true only for those that are wary of new food technologies.

Overall, our findings show that there is negative WTP for and willingness to choose cell cultured meat compared to conventional meat, which is driven significantly by diet, political beliefs, gender, technophobia, mistrust in mainstream news outlets, and prior objective knowledge on Canadian agriculture and cell cultured meat. Further, providing additional information on the production process of cell cultured ground beef to participants with high technophobia further decreases their WTP for cell cultured ground beef.

Therefore, advising a cell cultured meat company, for instance, on who to market their products to, where to advertise their products, and what message to convey in advertising poses a challenge. While production costs are still high, and cell cultured meat is considered a niche product, advertisers could begin by focusing their efforts on marketing to Canadians that are most open to purchasing cell cultured meat, which tend to be more so meat eaters, men, liberals, and those already knowledgeable on cell cultured meat. As for where to advertise, cell cultured meat companies should consider collaborating with reliable mainstream news outlets, as well as advertising on social media platforms. Finally, the messaging should be politically neutral, not too technical, and focusing on the animal welfare benefits, and/or similarities cell cultured meat has to conventional meat.

However, only marketing cell cultured meat to these demographics will not be enough if replacing conventionally produced meat with cell cultured meat is to be used as a tool to combat the climate crisis by reducing deforestation, water use, and reduce greenhouse gas emissions. The biggest challenges to the widespread acceptance of cell cultured meat that may prevent current meat consumers from entering the market, apart from cost and technophobia, is the politicization of cell cultured meat (as demonstrated in Figure 3). There may also be a general sense of mistrust a significant portion of Canadians have for government institutions and organizations such as the CFIA as shown in Figure 5, and news outlets in Figure 2. Specifically for government organizations to provide safe food, and mainstream news sources to provide reliable information. This is a larger issue that is outside of the scope of an advertiser besides conveying a clear message that is politically neutral, as providing additional information will have minimal effect on consumer choices if the consumer does not trust the information provided to be factual.

Therefore, the question of how to address food technology neophobia related to cell cultured meat, and how cell cultured meat will be perceived in the future when is becomes readily available remains an area of speculation. Bryant and Barnett (2018) believe consumer acceptance will likely increase when there is increased familiarity, commercial availability, and regulation, though we are more doubtful acceptance will increase linearly through time given the political nature of this innovation, paired with the significant portion of the population that does not believe both private and government institutions have their best interests in mind when it comes to providing food that is safe and healthy. Therefore, we suspect intentional avoidance of discussing the technicalities of the innovation in advertising could backfire, and result in more controversial regulations placed on cell cultured meat companies in the long run, as seen with the Texas meat and imitation food act. These regulations could subsequently lower consumer acceptance as cell cultured meat production becomes a mainstream political debate, if consumers speculate cell cultured meat companies have something to hide, thus creating an environment for misinformation and conspiracies to proliferate. So far, not much research has been conducted to test strategies on how to establish institutionalized trust amongst consumers to reduce food technology neophobia, but perhaps the strategy lies in not solely advertising to consumers, but also through public disclosure activities organized by cell cultured meat companies.

5.1 Limitations

There are some limitations to consider on this research. Firstly, the sample used in the study was recruited from Amazon Mechanical Turk (MTurk), resulting in potentially a skewed representation of age and gender demographics. Our sample is younger than the mean age of the Canadian population, potentially limiting the generalizability of the findings. Furthermore, the survey was conducted in Canada, but underrepresented francophones, affecting the comprehensiveness of the study's insights. Also, the sample size was relatively small, consisting of only 199 participants. This limited sample size may have reduced the statistical power and precision of the results, warranting prudence in generalizing the findings to a larger population.

Additionally, our decision to include 14 mainstream Canadian news sources that are relatively centrist to choose from, resulting in a considerable loss of variability in the bias and reliability score data for participants who did not trust any of the mainstream Canadian news sources listed to provide trustworthy and reliable information. Furthermore, the use of the Media Bias Fact Check website to assess the bias and reliability of news sources introduces another limitation, as this website itself may possess biases, potentially impacting the accuracy of the participants' scores.

Also, the methodology employed in this study involved online surveys, which have inherent limitations. Online surveys may be subject to self-selection bias and lack direct interaction with participants, potentially impacting the representativeness of the responses and limiting the researcher's ability to gather comprehensive insights. Another limitation arises from the hypothetical nature of the choice experiment, as cell cultured meat is not yet widely available in grocery stores. Participants' responses in hypothetical scenarios may not align with their real-world behaviours, necessitating caution when interpreting the findings in terms of actual consumer acceptance.

Despite these limitations, we believe that this study makes a valuable contribution to the literature by providing a more complete picture as to what factors are driving aversion to cell cultured meat in Canada. By presenting participants with news sources and asking them to select the ones they believe to provide reliable news information in addition to asking their political

leanings allowed for a better understanding of how both political leanings and mistrust in news organizations influence decision making.

5.2 Conclusion

Traditional livestock production's environmental impact, particularly land use and greenhouse gas emissions, has spurred interest in cell cultured meat as an ecologically conscious alternative. This research examines the influence of media bias, political polarization, and social media on consumers' acceptance of cultured meat. Through a choice experiment involving Canadian participants and various information treatments highlighting the taste of meat, the process of meat production, animal welfare considerations, or the environmental impact, our findings reveal a reluctance to choose and pay for cell cultured meat compared to conventional meat. This hesitance is driven by factors including diet, political beliefs, gender, technophobia, media mistrust, and prior knowledge of agriculture and cultured meat. Notably, individuals with high food technophobia show decreased willingness to pay after detailed production process information. The findings also highlight media mistrust as a barrier to cultured meat acceptance, reflecting broader societal skepticism. These insights pose challenges for marketers aiming to foster public trust in novel food products.

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7 Appendix

7.1 Food neophobia and technophobia: response to statements, and mean values

Survey question	Mean value on a 1 to 5 scale, 1 indicating "Strongly Agree" to 5 indicating "Strongly Disagree"	Average mean neophobia and technophobia values on a 1 to 5 scale*
Neophobia questions		
I am constantly sampling new and different foods	2.46	2.56
If I don't know what is in a food, I won't try it (R)	2.99	
At dinner parties, I will try a new food	1.99	
I will eat almost anything	2.78	
Technophobia Questions		
It may be risky to shift too hastily towards new food technology (R)	2.82	3.02
New food technologies decreases the natural quality of food (R)	3.04	
The media usually give correct impartial news on new food technologies	3.14	
Society should not depend so greatly on new technologies to solve food issues (R)	3.20	

(R) indicates reverse-coded questions
*Reverse coded question values are inverted, and mean values are averaged. 1 indicates low neophobia/technophobia, and 5 indicates high neophobia/technophobia.

7.2 Subjective vs. objective knowledge: response to true/false statements and reported confidence

Statement	Correct answer	% Correct response*	Average reported confidence (1-5)**	% Indicating confident or very confident
Organic animal agriculture questions				
If sick livestock are treated with antibiotics, they cannot be certified organic.	False	48.74%	2.78	26.53%
The feed of organically raised livestock cannot contain additives or preservatives.	False	37.74%	3.06	36.60%
For beef to be certified organic in Canada, all feed and pastures used for grazing must also be certified organic.	True	73.47%	3.05	33.33%
General animal agriculture questions				
Grass fed beef certification is regulated by the Canadian Food Inspection Agency (CFIA).	False	19.60%	3.01	34.19%
The majority of cows in Canada are fed a diet exclusively of corn and soybeans.	False	52.26%	2.72	24.87%
The Criminal Code of Canada prohibits anyone from willfully causing animals to suffer from neglect, pain, or injury.	True	86.43%	3.72	60.71%
Cell Cultured meat questions				
Cell cultured meat does not contain animal protein.	False	74.37%	2.94	36.93%
Cell cultured meat involves taking stem cells from muscle tissue or embryos of livestock.	True	67.34%	2.44	17.44%
Cell cultured meat involves stimulating stem cells into muscle and fat cells.	True	71.86%	2.43	19.59%

*If a participant left a true/false question unanswered, it is considered incorrect.
** If a participant did not give a confidence score, they are excluded from the average. Average confidence is measured on a scale ranging from 1 = not at all confident to 5 = very confident.

7.3 Grocery store prices on Nov 21, 2022 and Feb 8, 2023

Grocery Store Prices Nov 21, 2022: Prices range from $11.70 to $31.40 per kg
*the sale price is used for the price per unit and price per kg columns
Type: PB is Plant Based, T is traditional, and O is Organic

Store	Type	Product name	Price per unit	Price per kg	Sales Info
Metro	PB	Beyond Beef	$6.00 for 340g	$17.60/kg	On sale from $9.99 for 340g
Metro	PB	Impossible Plant-Based Ground	$9.99 for 340g	$29.40/kg	On sale from $10.99 for 340g
Metro	PB	Gusta Veggie Ground	$4.99 for 340g	$14.70/kg	
Metro	PB	Yves Original Veggie Ground Round	$6.29 for 340g	$18.50/kg	On sale from $6.49 for 340g
Metro	T	Medium Ground Beef	$5.94 for 450g	$13.21/kg	On sale from 14.97/kg
Metro	T	Medium Ground Beef, Value Pack	$15.31 for 1200g	$12.76/kg	On sale from $13.87/kg
Metro	T	Extra Lean Ground Beef	$8.92 for 450g	$19.82/kg	
Metro	T	Extra Lean Ground Beef, Value Pack	$14.98 for 800g or $19.28 for 1200g	$16.07-$18.72/kg	
Metro	T	Fontaine Family Lean Ground Beef	$6.00 for 454g	$13.20/kg	On sale from $9.99 for 454g
Metro	O	Organic Lean Ground Beef Les Fermes Valens	$10.99 for 350g	$31.40/kg	
Provigo	PB	President's Choice Plant-Based Beefless Undeniable Burger	$11.99 for 452g	$26.50/kg	
Provigo	PB	Lightlife Plant-Based Crumbles Original	$3.99 for 340g	$11.70/kg	On sale from $4.99 for 340g
Provigo	T	Medium Ground Beef, Tray Pack	$5.81 for 440g	$13.21/kg	
Provigo	T	Lean Ground Beef, Tray Pack	$6.00 for 419g	$14.31/kg	
Provigo	T	Extra Lean Ground Beef, Tray Pack	$6.01 for 390g	$15.41/kg	
Provigo	T	President's Choice Extra Lean Ground Sirloin	$9.00 for 454g	$19.80/kg	

Grocery Store Prices Feb 8, 2023: Prices range from $8.55 to $39.80 per kg
*the sale price is used for the price per unit and price per kg columns
Type: PB is Plant-Based, T is traditional, and O is Organic

Store	Type	Product name	Price per unit	Price per kg	Sales Info
Metro	PB	Beyond Beef	$6.00 for 340g	$17.60/kg	On sale from $9.99 for 340g
Metro	PB	Impossible Plant-Based Ground	$8.99 for 226g	$39.80/kg	
Metro	PB	Gusta Veggie Ground	$4.99 for 340g	$14.70/kg	
Metro	PB	Yves Original Veggie Ground Round	$6.99 for 340g	$20.60/kg	
Metro	T	Medium Ground Beef	$6.74 for 450g	$14.97/kg	
Metro	T	Medium Ground Beef, Value Pack	$16.64 for 1200g	$13.87/kg	
Metro	T	Extra Lean Ground Beef	$5.45 for 450g	$12.10/kg	On sale from $19.82/kg
Metro	T	Extra Lean Ground Beef, Value Pack	$6.84 for 800g	$8.55/kg	On sale from $18.72/kg
Metro	T	Fontaine Family Lean Ground Beef	$9.99 for 454g	$22.00/kg	
Metro	O	Organic Lean Ground Beef Les Fermes Valens	$11.49 for 350g	$32.80/kg	
Provigo	PB	President's Choice Plant-Based Beefless Undeniable Burger	$11.99 for 452g	$26.50/kg	
Provigo	PB	Lightlife Plant-Based Crumbles Original	$4.99 for 340g	$14.70/kg	
Provigo	T	Medium Ground Beef, Tray Pack	$4.32 for 491g	$8.80/kg	
Provigo	T	Lean Ground Beef, Tray Pack	$5.06 for 460g	$11.00/kg	
Provigo	T	Extra Lean Ground Beef, Tray Pack	$5.47 for 414g	$13.21/kg	
Provigo	T	President's Choice Extra Lean Ground Sirloin	$9.00 for 454g	$19.80/kg	

7.4 Additional comments from debrief section of the survey

1. I am completely open to purchasing and eating cultured meat. No issues on my end trying it or purchasing it if the price is cheaper than standard meat.
2. I have no problem with purchasing cell cultured beef if the price is good and it gives me strength the way regular red meat does.
3. The butcher I go to only sells meat from Quebec. It may not be organic but they buy from smaller slaughterhouses where nothing from the animal is wasted. They also buy animals that they then cut up and never waste anything. I feel responsable buying meat from this dedicated butcher.
4. lab grown meats are okayish but I'd still choose plant based....to be honest I dislike the taste of beef and veggie ground
5. Mean might not be too healthy but it is something most people can't do without.
6. I generally try to eat more "white and lean" meat (e.g. chicken, turkey, de-fatted beef) raised on farms as much as possible.
7. Factory farming is cruel and should be phased out, and lab-grown meat can help accomplish that. Money is tight now with inflation though, so I can't afford to spend much more on my food budget.
8. the icon with cow and red line may stop me from purchasing the product.
9. just healthy and safety
10. We should limit meats due to the Carbon emissions of raising livestock. However, cultured meats have less of a carbon footprint which I believe is a win for the meat industry
11. it wasn't an option, but i try to reduce meat consumption because it has become so expensive.
12. I have no limits or restrictions on meat consumption. I am not too educated on how meat is produced (e.g. feeding practices). Therefore, I don't have any thoughts on meat production.
13. this makes me want to google more about cell cultured meat
14. I believe the current system of meat production is not sustainable.
15. Meat is a staple food for many people and for me, considering how the prices are going sky high for vegetables with lesser nutritional value every day, it is important that meat should hold its nutritional value.
16. Although ethics is the main reason I am trying to reduce my meat consumption, it also definitely has to do with the fact that my spouse is a vegetarian. Just noting it because the options for why did not include this reason.
17. I would buy cell cultured meat if there was more information about it. cell cultured meat is still a new thing, I need to see more information about it and then i can compare the two and maybe then buy cell cultured meat.
18. Meat production should be done in organic manner
19. I am completely open to trying this kind of meat, without hesitation.
20. I'm a little bit leery of cell cultured meat. I would try it.
21. Just healthy and good taste
22. I only prefer conventional beef

23. I do think I eat too much beef, and I am worried about the impact of conventional cattle farming. So I would be interested in cell cultured meat.
24. I try to buy organic if I can, as the cows will typically be treated better, not to mention the meat is likely better for us.
25. whilst I am open minded about trying cultured meat, there is a significant mental leap that I would have to make in order to consume in on a regular basis. Also the price would have to be less than non-cultured meat
26. I'm a big meat eater and I also appreciate environmental concerns, however in this inflating economy I think price has become a very important factor when deciding what to buy. I'm also not a big fan of non-natural food sources.
27. I haven't eaten red meat for so long I'd be a bit hesitant to even eat cell-cultured meat, but I'd be open to trying it, and if it's cruelty-free and environmentally better than regular meat, I'd be excited about it.
28. I have been a vegetarian for many years and while I am excited about the idea of lab grown meat hitting grocery store shelves, I am worried that I might not enjoy it since meat no longer seems like "food" to me - I might still prefer plant based even if lab grown meat is available. It would be great for the environmental impacts and animal cruelty aspects though if people who ate meat regularly would switch to lab grown meat instead.
29. It is adventurous
30. I am a saver in these inflated times and care more about mu budget than the planet
31. There should be an inbetween. There can be a better way to get meat without messing with nature.
32. the information was very interesting and i may research it more. Many thanks.
33. I would have to do more research regarding cell cultured meat to make an informed decision, but normally I am opposed to modifying animals and plants for consumption.
34. I feel that meat alternatives should be cheaper that real meat.
35. I think meat prices are too high
36. I have concerns about the reliability and safety of the food supply provided by the Canadian Food Inspection Agency. I do not fully trust their nutrition standards and am afraid that the food they approve could potentially be harmful to my health. I have come to this conclusion through seeing that the government has not had anyone's safety as a priority these last three years. And we should all be very scared in Canada right now.
37. My main reason for wanting to reduce my meat consumption is due to wanting to be more humane towards animals. That's also why I support lab grown meat. The fewer animals that need to die for food, the better.
38. i think that it is a good plan to try and be environmentally friendly, but ultimately it will depend on financial incentives.
39. although eating cell cultured meat would eliminate animal cruelty, it will still be unhealthy just like regular meat.
40. Meat consumption is not too healthy on the long run but it's a diet we can't really do without.

41. I don't eat a lot of meat, but what I do eat I generally enjoy. The idea of meat (or any food) being modified makes me uncomfortable.
42. My rankings for the previous question could have easily been a tie. Many of my purchases are limited by cost; I always try to consider the distance traveled of the food I consume. Taste and nutritional value are both very important to me, so they could be tied as well.
43. I think that to make cultured meat and organic meat viable, it needs to make sense economically.
44. We have reduced our meat consumption over the years, but not completely stopped since believe that there are nutrients we can only get from animal meat.
45. I think cultured meat is not a good idea. It's just not natural. I'm sure there are ways to improve meat production without having to use artificial methods.
46. I actually really do care about reducing how much meat we consume as a society & the pain/suffering of farm animals and the environmental impact of meat consumption, however it is very difficult to actually put these feelings into practice in reality, in reality the cheapest and most convenient options will win for me because frankly there's so many "ethical dilemmas" to deal with every day living in capitalist colonial society that you end up becoming numb to a lot of them. Therefore I think if something will taste just as good but can be a very comparable price, it would be great to find alternatives that could genuinely make a difference at the supermarket.
47. I am very particular about meat and would always stick with organic one.
48. I usually look for the lowest price beef. I would try cell culture beef.
49. I usually look for the lowest price beef. I would be willing to try cell culture beef although I am unsure about it nutritional value.
50. I wish that consumers had more information in regard to meat consumption and production. I still don't know what exactly qualifies as organic, and wish there was an independent body to make recommendations.
51. I think it is exciting that there are new product lines coming on-stream that provide more humane alternatives or replacements to traditional meat items.
52. We should try to reduce the assumption of beef and increase assumption of fish
53. I am a guilty meat eater. I know it's not the best option out there, but I also love it and don't want to stop eating it.
54. I seldom eat beef because beef contains trans fats. It doesn't matter to me at all whether the trans fats are naturally created by the cow or not.
55. Although its great that we are advancing on so many levels with technology,but taste and organic is what counts for myself atlest at the end.
56. I hope cultured meat price will be reduce to a level where it's lower than conventional meat.
57. Apparently I have long covid symptons? that make the smell of meat, onions, and coffee smell disgusting to me. Seafood doesn't bother me at all. So I have tried plant based meat but it's pretty expensive so these days I'll eat some sort of bean burger or veggie burger. I think cell cultured meat is a good idea, but it won't work for me as I seem to have become a pescatarian (which was a new word for me....). On a positive note, It seems to have made me a lot healthier (blood work, etc.) Although certain

foods smell like a sewage plant to me, my sense of smell and taste seems to be heightened. So covid may have made me healthier???
58. I don't think about it nearly as much as everybody else does, but I don't eat a lot of meat anyway.
59. I believe in consuming food in a neutral and conventional way, whether it's vegetable or non-vegetable. Nowadays, many major companies are attempting to modify and alter natural foods, which I believe may ultimately harm human health.
60. safe but save is important to people
61. Much of my meat is hunted as beef is costly to fly to the Arctic.
62. meats are getting more expensive now so we may need to find some alternatives very soon
63. It’s a tough subject because we still rely heavily on meat and we need to find alternatives to reduce the negative impact on the environment.
64. I think cultured meats will be an inevitability to combat climate change.
65. I try to buy free range or free run eggs when the price is not too high.
66. People need to be made aware of the health, environmental and ethical aspects of consuming meat starting as early as possible in life. That will help with reducing consumption, reducing food waste and the environmental impact of us being used to comfortably consuming meat at all times.
67. I think artificial meat will be revolutionary for the world.
68. I would be willing to try it and if it cooks and tastes the same and the price is the same as conventional beef I would probably switch.
69. I am against meat
70. A bit unsure on if I ethically support cell cultured meat, but would be interested in trying and finding out more information about it
71. I am completely open to ingesting and purchasing cultured meat. I wish it was happening on a more massive scale worldwide.
72. I have never thought about it much.
73. I typically buy the cheapest option but would 100% try cell cultured meat
74. I think organic food products are the best for consumption.
75. Make these more sustainable options more financially viable. Stop trying to save the planet at the expense of the consumer.
76. I believe cultured meat will be the wave of the future, at least once they can duplicate the taste of conventional meat and at least approximate the cost.
77. I have many friends who are in agriculture/ranching and I believe it can be done sustainably. However I also think that the vast majority of Canadians eat too much meat and we can reduce how much we can eat.
78. I think producers have an uphill battle convincing consumers to try lab-grown meat because the traditional method of cattle farming is so engrained in our culture. However, with global warming a pressing issue nowadays and high inflation, if it can be produced sustainably and at reasonable cost, consumers may be willing to try it out.
79. I would love to eat Cell Cultured Meat if the price were in-line with regular, or organic beef.

80. I haven't eaten beef for quite a while, but I don't like plant-based "ground beef" either. So I just do without it.
81. Cost isnt an issue that would sway me to change my ways. If times were tough I may try it
82. organic meat products tend to have more health benefits
83. I am scared of cheaply produced meat due to the mass amount of hormones it includes. I have PCOS and the hormones are very bad for me. I am also worried for the environment...
84. I prefer meat alternatives that don't look like meat, probably because I have been vegetarian for over 20 years and the thought of meat is revolting to me. I enjoy veggie burgers and whatnot, but I want it to look like a veggie burger. I have to say though that I am for anything that doesn't harm an animal and will reduce our meat consumption.
85. I think that eating proper organic beef is good for people and the research agrees. People should eat more organic meats, especially beef
86. I generally steer away from any meat alternatives and instead choose to just use beans, lentils, tofu to make my own alternatives at home.
87. Cell cultured meat is the correct ethical choice.
88. very healthy and good for health
89. it's fine
90. I'm not opposed to trying cell cultured meat but I would rather buy "natural" meat for now. Something feels off about cell cultured for some reason.
91. The un-natural production of meat is disturbing to me. I do not want to have anything to do with it and do not want it.
92. I think cell cultured meat will not meet the basic body dietary requirements like protein and vitamins content.
93. Meat consumption must be regulated in once life
94. I don't understand why fake meat is so important. If you don't want/need to eat meat, don't eat it. This is entirely unnecessary and further divorcing us from natural connection to our food.
95. I had personally tried the plant based meal, I think they taste very close to the real meal, but I still prefer to purchase traditional meal if the price difference is minimal.
96. In my opinion, sustainability and the environment are very important topics especially when the population is growing exponentially while resources are finite. How ever it is not feasible to ever expect this movement to produce results because of the capitalist structure of our society. Companies need to report profits, the rich will do what ever it takes to remain on top. Even if you get 1 million middle class people to save 1 liter of water a day for example, all it takes is 1 t shirt company to dump some chemicals in a lake and all that is ruined. they get fined 10k but make millions. Same thing with food. If a industry is profitable the rich will do what ever it takes, they have pretty much brain washed the average consumer into thinking they need things they dont actually need like syrups and sugars. With meats their will always be demand for it because of mcdonalds (a core of the american diet) etc, shifting the paridigm to include non traditional methods like insect proteins etc will take decades. Even vegan protein diets are frowned upon in our day. Producing

	artificial meat that tates the same and has the same nutritional value will probably overtake traditional meats if it can be cheaper and endorsed by social media and food cooporations. it will take time
97.	If the cell cultured meat tastes the same, I would definately buy it
98.	I think the biggest issue for me with meat is the high cost and the thought of an animal being butchered, so cell grown would really appeal to me.
99.	I believe meat is an important part of anyone's diet as even if you don't eat meat you still need the nutrients from a different source, most farmers in Alberta maintain a good environment for their cattle keeping up with animal rights restrictions and bylaws
100.	Is it Halal - Hand Slaughtered?
101.	I think this is an interesting direction in food production. If we were to mass adopt this meat product it would have to be considered safe to eat by the CFIA if i were to ever try this type of product.
102.	I think that if we like to eat meat, we should treat animals with respect, we are killing them to survive, they should have a decent and happy life before.
103.	I am willing to try cell cultured meat if the price is the same and if the it tasted similar to regular beef. However, I would not go out of my way to try it.
104.	My understanding is that the environmental impact of beef is particularly bad, and that even shifting to pork or chicken would have a substantive impact on CO2.
105.	I don't have any additional comments that come to mind at the moment.
106.	I would eat more meat if prices were lower.
107.	As a pescatarian living in Canada, I feel like we don't have enough "fake meat" products compared to some other countries so I'm all for more!
108.	Price is a large factor and cultured meat should be really cheap.

7.5 Full survey in English and French

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Consumer attitudes towards meat and meat alternative products

Thank you for participating in this survey.

Please read the detailed terms outlined on the next page. Participating your survey in response indicates that you consent to participate in this study.

Participation is voluntary and you can withdraw from participation anytime. The survey will take approximately 15 minutes and participating involves no physical or psychological risks.

The principal investigator is Dr. Ashok Mishra, professor of agricultural economics at Kansas State University. If you have questions or concerns about this study, you can contact Dr. Mishra at amishra@ksu.edu or 785-532-4936. Dr. Mishra's address is Waters Hall, 2014 Throckmorton Plant Sciences Center, Manhattan, KS 66506. If you have questions about your rights as a participant in research, you can contact the Kansas State University Research Compliance Office at 1-888-532-1961 or email irb@k-state.edu.

Your data will be anonymized and will be stored on secure servers. Participating in the study will force no direct benefits to you, however, we hope to learn about consumer attitudes and purchasing decisions surrounding meat products.

We will be compensated $15 for your participation. Upon completing the survey, you will be given a unique code to enter into MTurk portal. Use this to certify to complete the research team your compensation will be released. Participation will be rejected if the same MTurk account, IP address, or other identifiers are used to complete the survey more than once. Participation will be rejected if the survey is not completed.

Please ask questions if anything is not clear or you would like more information. If you have any questions about the research feel free to contact Pavel Ilyukhin (email: pavel@k-state.edu) or Dr. Ashok Mishra (email: amishra@ksu.edu).

If you have any ethical concerns or complaints about your participation in the study, and wish to speak with someone besides the research team, please contact the Human Research Protection Program (HRPP) at 1-888-532-1961 or irb@k-state.edu or visit the HRPP office at 2005 Fairchild Hall.

Thank you for your participation!

There are 15 questions in this survey.

Consent Question

De-identified data from this survey may be shared on a public database for research purposes. Any data uploaded to a public research database will not include any personally identifiable information. Only the research team will have access to the data set. Data set can then, if you would like to participate in the study but not have your data included in the public database, please check the box below.

Please choose only one of the following:

- Do not agree to have my de-identified data included for future research

Demographic Questions

Where do you live?
Please choose all that apply:

- Select all that apply
- Northeast
- Midwest
- Great Plains
- Rocky mountain area
- Other (please specify)

What best describes the area where you live?
Please choose only one of the following:

- Choose one of the following answers
- Urban (population greater than 50,000)
- Urban
- Suburban
- Rural

What is your preferred provider?
Please choose all that apply:

- Select all that apply
- Walmart
- Sam's Club
- Costco
- Kroger
- Other (please specify)

How old are you?
Please choose only one of the following:

- Choose one of the following answers
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or older
- Prefer not to say

Demographic Questions 2

What is the highest level of education you completed?
Please choose only one of the following:

- Choose one of the following answers
- Less than high school
- High school graduate
- College, GED, or vocational/technical
- Bachelor's degree
- Master's degree
- Doctoral or professional degree

What is your household income?
Please choose only one of the following:

- Choose one of the following answers
- Under $25,000
- $25,000-$49,999
- $50,000-$74,999
- $75,000-$99,999
- $100,000-$149,999
- $150,000 or more

Which category best describes you?
Please choose only one of the following:

- Choose one of the following answers
- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian and other Pacific Islander
- White
- Prefer not to say

Which of the following best describes your profession?
Please choose only one of the following:

- Choose one of the following answers
- Farming, fishing, and forestry occupations
- Energy conservation
- Production
- Transportation
- Other occupation not listed
- Retired
- Managing Director

Which non-perishable household goods do you buy?
Please choose all that apply:

- Choose one or more of the following answers
- Canned food
- Dry food (Pasta, Cereal, Rice)
- Cleaning supplies (Laundry detergent, Bleach, Soap)
- Paper products
- Toiletries
- Bottled water
- Batteries
- Other (please specify)

Demographic Questions 3

Do you or a member of your immediate family work in the agricultural sector?
Please choose only one of the following:

- Select one of the answers
- Yes
- No
- Prefer not to say

Please describe your family member's position.
Please write your answer here:
(Hint: Enter your answer in the box provided. Press the enter key when you are done. Hint: Enter your answer in the box provided. Press the enter key when you are done.)

Please describe your position.
Please write your answer here:
(Hint: Enter your answer in the box provided. Press the enter key when you are done. Hint: Enter your answer in the box provided. Press the enter key when you are done.)

Which best describes your family income?
Please choose only one of the following answers:

- Choose one of the following answers
- Very low
- Slightly someone else
- Roughly the same as other people in my household

Demographic Questions 4

Do you as an individual have any dietary restrictions or requirements?
Please choose all that apply:

- Select all that apply
- None
- Vegetarian/Lacto-ovo
- Vegetarian/Pescatarian
- Religious dietary restrictions/requirements
- Allergies or dietary restrictions/requirements
- Other (please specify)

What is your primary reason for not eating meat and/or animal products?
(Hint: Enter your answer in the box provided. Press the enter key when you are done. Hint: Enter your answer in the box provided. Press the enter key when you are done.)
Please choose all that apply:

- Select one of the answers
- Health
- Environmental
- Moral
- Religious
- Other

Demographic Questions 5

In an average week, how often do you consume beef? (ex. steak, hamburgers, ground beef)
Please choose only one of the following:

- Choose one of the following answers
- Not meat-eaters day
- 1 or less a week
- 2 or 3 days a week
- 4 or 5 days a week
- 6 or more days a week
- Other (please specify)
- None

Do you strive to reduce the amount of meat in your diet?
Please choose all that apply:

- Select one of the answers
- Yes
- No

What is your primary reason for reducing your meat consumption?
(Hint: Enter your answer in the box provided. Press the enter key when you are done. Hint: Enter your answer in the box provided. Press the enter key when you are done.)
Please choose all that apply:

- Select one of the answers
- Health
- Environmental
- Moral
- Other (please specify)

Where does the majority of the meat you consume come from?
Please choose all that apply:

- Select one of the answers
- Grocery store
- Restaurant
- Other (please specify)

Technology and Food

Please indicate how strongly you agree with each of the statements below:
Please choose the appropriate response for each item:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am comfortable with food made from genetic modification	○	○	○	○	○
I'd don't know what to a food, I want my it.	○	○	○	○	○
on dinner parties, I will try a new food	○	○	○	○	○
I will eat anyone else's food	○	○	○	○	○
A big fan today is with has family towards new food	○	○	○	○	○
New food technologies threaten the natural quality of food	○	○	○	○	○
The media usually gives correct impartial news on new food technology	○	○	○	○	○
Society should not depend so greatly on new technologies to solve food issues	○	○	○	○	○

News Sources

What is the following news sources, radio, or stations do you trust or provide reliable news information?
Please choose all that apply:

- Select one or more of the following answers
- The Wall Street Journal
- The New York Times
- Fox News/radio
- CNN/HLN/TNT
- Wall Street
- Radio Company/ESPN
- NPR
- Sirius
- Sirius Sun
- Al Pitman
- Rush Limbaugh
- Big Tom
- Al Sharpton
- Sean Hannity
- Glenn Beck
- Local or Bi-Partisan/Journal de Quebec
- Local or Bi-Partisan/Journal de Montreal
- Local or Bi-Partisan/ Ici Radio-Canada Premiere
- Other (please specify)

What is your main source of news?
Please choose all that apply:

- Television
- Internet
- Social Media
- Radio
- Printed newspaper or magazine
- Other (please specify)

Social Media

Which social media platforms do you use?
Please choose all that apply:

- Select one or more of the following answers
- Facebook
- Twitter
- Instagram
- Reddit
- Snapchat
- Tumblr
- Pinterest
- Google+
- LinkedIn
- None
- Other (please specify)

Knowledge

The sun produces dark half-cured and livestock predominate in Canada. The cash grains, plant, other crops, other the western is rice is that, perform combined zone or are cereal in 1 non-and of combined. 1 is very confident.
Please choose the appropriate response for each item:

	True or False		Confidence (1 = very not at all confident, 2 = very confident)			
	True	False	1 = Not at all confident	2	3	4 = very confident
If a cow is transient one breeder with antibiotics, they cannot be confined	○	○	○	○	○	○
The food of organically raised livestock cannot contain antibiotics or pesticides	○	○	○	○	○	○
It's hard to be confident organic in Canada, or feed and pesticide used for growing corn and soy, or feed grains	○	○	○	○	○	○
Grass-fed beef certification is regulated by the Canadian Food Inspection Agency (CFIA)	○	○	○	○	○	○
The majority of farms in Canada are farm-raised aquaculture, or are wild harvesters	○	○	○	○	○	○
The Animal Code of Canada prohibits anyone from selling meat or products unless it is from a federally inspected slaughterhouse	○	○	○	○	○	○
Cattle are fed a diet of grain to make them tender and juicy	○	○	○	○	○	○
Cattle produced meet brachiosa taking stem cells from muscle tissue or embryos	○	○	○	○	○	○
Cattle produced meet muscle stimulating stem cells into muscle and fat cells	○	○	○	○	○	○

(select_1_4)
(Hint: Select the correct answer.)
(ex.{{{selectoption_0}}}, {{{selectoption_1}}}, {{{selectoption_2}}}, {{{selectoption_3}}}, {{{selectoption_4}}}, {{{selectoption_5}}}, {{{selectoption_6}}}, {{{selectoption_7}}}, {{{selectoption_8}}}, {{{selectoption_9}}}, {{{selectoption_10}}}, {{{selectoption_11}}}, {{{selectoption_12}}}, {{{selectoption_13}}}, {{{selectoption_14}}}, {{{selectoption_15}}}, {{{selectoption_16}}}, {{{selectoption_17}}}, {{{selectoption_18}}}, {{{selectoption_19}}}, {{{selectoption_20}}}, {{{selectoption_21}}}, {{{selectoption_22}}}, {{{selectoption_23}}}, {{{selectoption_24}}}, {{{selectoption_25}}}, {{{selectoption_26}}}, {{{selectoption_27}}}, {{{selectoption_28}}}, {{{selectoption_29}}}, {{{selectoption_30}}}, {{{selectoption_31}}}, {{{selectoption_32}}}, {{{selectoption_33}}}, {{{selectoption_34}}}, {{{selectoption_35}}}, {{{selectoption_36}}}, {{{selectoption_37}}}, {{{selectoption_38}}}, {{{selectoption_39}}}, {{{selectoption_40}}}, {{{selectoption_41}}}, {{{selectoption_42}}}, 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Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Crossbreed Ground Beef	Organic Free Range Ground
$4.00 (8-12 lb/bag)	$6.00 (8-12 lb/bag)	$8.00 (8-12 lb/bag)

Only assess the question if the following conditions are met:
- (Attention check) = (1)
- Choose one of the following answers:
- Please choose only one of the following:

○ A
○ B
○ C
○ I would not choose any of these

◯ C
◯ I would not choose any of these.

Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Plant-Based Ground	Organic Plant-Based Ground
$6.00/lb ($13.23/kg)	$7.00/lb ($15.43/kg)	$7.00/lb ($15.43/kg)

Only answer this question if the following conditions are met:
((RandomizationV == "7"))
❶ Choose one of the following answers
Please choose **only one** of the following:

◯ A
◯ B
◯ C
◯ I would not choose any of these.

Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Plant-Based Ground	Organic Plant-Based Ground
$9.00/lb ($19.84/kg)	$8.00/lb ($17.54/kg)	$7.00/lb ($15.43/kg)

Only answer this question if the following conditions are met:
((RandomizationV == "8"))
❶ Choose one of the following answers
Please choose **only one** of the following:

◯ A
◯ B
◯ C
◯ I would not choose any of these.

Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Plant-Based Ground	Organic Plant-Based Ground
$7.00/lb ($15.43/kg)	$7.00/lb ($15.43/kg)	$7.00/lb ($15.43/kg)

Only answer this question if the following conditions are met:
((RandomizationV == "8"))
❶ Choose one of the following answers
Please choose **only one** of the following:

◯ A
◯ B
◯ C
◯ I would not choose any of these.

Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Plant-Based Ground	Organic Plant-Based Ground
$7.00/lb ($15.43/kg)	$7.00/lb ($15.43/kg)	$8.00/lb ($17.54/kg)

Only answer this question if the following conditions are met:
((RandomizationV == "8"))
❶ Choose one of the following answers
Please choose **only one** of the following:

◯ A
◯ B
◯ C
◯ I would not choose any of these.

Which of the following would you purchase?

A	B	C
Cell Cultured Ground Beef	Plant-Based Ground	Organic Plant-Based Ground
$9.00/lb ($19.84/kg)	$7.00/lb ($15.43/kg)	$9.00/lb ($19.84/kg)

Only answer this question if the following conditions are met:
((RandomizationV == "8"))
❶ Choose one of the following answers
Please choose **only one** of the following:

◯ A
◯ B
◯ C
◯ I would not choose any of these.

Debrief

How willing would you be to try cell cultured meat if you had the opportunity?
Not at all willing (1) to very willing (5)
Please choose **only one** of the following:

◯ 1
◯ 2
◯ 3
◯ 4
◯ 5

How willing would you be to purchase cell cultured meat if the price and taste were the same as conventional meat?
Not at all willing (1) to very willing (5)
Please choose **only one** of the following:

◯ 1
◯ 2
◯ 3
◯ 4
◯ 5

How trusting are you in the Canadian Food Inspection Agency (CFIA) to provide a reliable and safe food supply?
Not at all trusting (1) to very trusting (5)
Please choose **only one** of the following:

◯ 1
◯ 2
◯ 3
◯ 4
◯ 5

When making decisions about your meat purchases, how important are the following factors?

Only answer this question if the following conditions are met:
Answer was at question '15 [DietRestrict]' (Do you as an individual have any dietary restrictions or requirements?) and Answer was at question '15 [DietRestrict]' (Do you as an individual have any dietary restrictions or requirements?) and Answer was at question '15 [DietRestrict]' (Do you as an individual have any dietary restrictions or requirements?) and Answer was NOT 'Never' at question '17 [BeefConsume]' (In an average week, how often do you consume beef? (ex. steak, hamburgers, ground beef))
❶ All your answers must be different and you must rank in order.
❷ Please select at most 4 answers
Please number each box in order of preference from 1 to 4

[ ] Price
[ ] Taste
[ ] Environmental Impact/Sustainability
[ ] Nutritional Value

When making decisions about your meat alternative purchases, how important are the following factors?

Only answer this question if the following conditions are met:
((DietRestrict_SQ001.NAOK == "Y") or (DietRestrict_SQ002.NAOK == "Y") or (DietRestrict_SQ003.NAOK == "Y"))
❶ All your answers must be different and you must rank in order.
❷ Please select at most 4 answers
Please number each box in order of preference from 1 to 4

[ ] Price
[ ] Taste
[ ] Environmental Impact/Sustainability
[ ] Nutritional Value

Please share any additional comments or thoughts you have about meat consumption and production:
Please write your answer here:

MTurk Code

Please enter the following code into MTurk:

T{if(!is_empty(MTurkCode),MTurkCode,1*rand(357382, 908173))}

Thank you for your participation!

If you have any questions about the survey, please do not hesitate to contact Pierre Soudry (pierre.soudry@mail.mcgill.ca) or Prof. Mary Doidge (mary.doidge@mcgill.ca).

If you have any ethical concerns or complaints about your participation in this study, and want to speak with someone noton the research team, please contact the Associate Director, Research Ethics at 514-398-6831 or lynda.mcneil@mcgill.ca citing REB file number 22-08-125

Submit your survey.
Thank you for completing this survey.

Consommateurs et confiance

Rapport du ministère du Conseil du premier Ministre. Le ministère du Conseil du premier ministre collige pour vous l'ensemble d'analyses et de faits.

Ce document est produit par le ministère du Conseil du premier ministre à partir des données du Centre de recherche et de statistiques de l'Université Ryerson et de l'Institut de la confiance du consommateur du Canada.

Ce document est un document de travail qui est en constante évolution. Il est mis à jour chaque semaine.

Dans ce document, le mot « consommateur » est employé comme le mot « citoyen » et « citoyenne » et « consommation » comme « citoyenneté ».

Nous avons demandé aux participants, dans le cadre d'une étude de marché, de classer des produits alimentaires de différentes catégories en fonction de leur préférence. Le produit de chaque catégorie présentait certaines caractéristiques qui lui conféraient un avantage concurrentiel. Les caractéristiques des produits étaient présentées de la manière suivante :

J'ai la tête ci-dessus.
Cliquez ici une seule des propositions suivantes :
- ☐ A
- ☐ B
- ☐ C
- ☐ D

New Choice Questions

Nous avons demandé aux participants, dans le cadre d'une étude de marché, de classer des produits alimentaires de différentes catégories en fonction de leur préférence. Le produit de chaque catégorie présentait certaines caractéristiques qui lui conféraient un avantage concurrentiel. Les caractéristiques des produits étaient présentées de la manière suivante :

Qu'est-ce ci-dessus. Cliquez ici une seule des propositions suivantes :
- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ Ne m'intéresse aucun de ces-ci

Lequel des produits suivants achèteriez-vous ?

A	B	C	D
Bleu/ Sachet de calcium enfantine	Bleu/ Yaourt aromatisé	Bleu/ Yaourt aromatisé	Bleu/ Yaourt aromatisé
0,25 EN, 1,75 BE 30 Kcal	0,25 EN, 1,77 BE 34 Kcal	0,25 EN, 1,79 BE 38 Kcal	0,25 EN, 1,79 BE 38 Kcal

Répondre à cette question seulement si les conditions suivantes sont réunies : Produit=Yaourt aromatisé

Veuillez sélectionner une réponse à l'intérieur :
Veuillez sélectionner

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "7"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
8,00 $/lb (17,54 $/kg)	6,00 $/lb (13,23 $/kg)	8,00 $/lb (17,54 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "7"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
6,00 $/lb (13,23 $/kg)	7,00 $/lb (15,43 $/kg)	7,00 $/lb (15,43 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "7"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
9,00 $/lb (19,84 $/kg)	8,00 $/lb (17,54 $/kg)	7,00 $/lb (15,43 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "8"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
7,00 $/lb (15,43 $/kg)	7,00 $/lb (15,43 $/kg)	7,00 $/lb (15,43 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "8"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
7,00 $/lb (15,43 $/kg)	7,00 $/lb (15,43 $/kg)	8,00 $/lb (17,54 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "8"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Lequel des produits suivants achèteriez-vous ?

A	B	C
Bœuf haché de culture cellulaire	Hachée à base de plantes	Hachée biologique à base de plantes
9,00 $/lb (19,84 $/kg)	7,00 $/lb (15,43 $/kg)	9,00 $/lb (19,84 $/kg)

Répondre à cette question seulement si les conditions suivantes sont réunies :
@{Randomization/ == "8"})

❗ Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A
- B
- C
- Je ne choisirais aucun de ceux-ci.

Debrief

Dans quelle mesure seriez-vous disposé à essayer la viande cultivée en cellules si vous en aviez l'occasion? Pas du tout disposé (1) à très disposé (5)

Veuillez sélectionner une seule des propositions suivantes :

- 1
- 2
- 3
- 4
- 5

Dans quelle mesure seriez-vous disposé à acheter de la viande cultivée en cellule si le prix et le goût étaient les mêmes à ceux de la viande conventionnelle? Pas du tout disposé (1) à très disposé (5)

Veuillez sélectionner une seule des propositions suivantes :

- 1
- 2
- 3
- 4
- 5

Dans quelle mesure faites-vous confiance à l'Agence canadienne d'inspection des aliments (ACIA) pour fournir un approvisionnement alimentaire fiable et sécuritaire? Pas du tout confiant (1) à très confiant (5)

Veuillez sélectionner une seule des propositions suivantes :

- 1
- 2
- 3
- 4
- 5

Lorsque vous prenez des décisions concernant vos achats de viande, quelle est l'importance des facteurs suivants ?

Répondre à cette question seulement si les conditions suivantes sont réunies :
La réponse était à la question "15 [DietRestrict]" (En tant qu'individu, avez-vous des restrictions ou des exigences alimentaires ?) et La réponse était à la question "15 [DietRestrict]" (En tant qu'individu, avez-vous des restrictions ou des exigences alimentaires ?) et La réponse était à la question "15 [DietRestrict]" (En tant qu'individu, avez-vous des restrictions ou des exigences alimentaires ?) et La réponse n'était PAS "Jamais " à la question "17 [BeefConsume]" (En moyenne, consommez-vous souvent du bœuf? (p. ex. steak, hamburgers, bœuf haché))

❗ Vos réponses doivent être différentes, et vous devez les classer dans l'ordre.
❗ Veuillez sélectionner 4 réponses maximum
Numérotez chaque case dans l'ordre de vos préférences de 1 à 4

_____ Prix
_____ Goût
_____ Impact environnemental/durabilité
_____ Valeur nutritive

Lorsque vous prenez des décisions concernant vos achats de substituts de viande, quelle est l'importance des facteurs suivants ?

Répondre à cette question seulement si les conditions suivantes sont réunies :
((DietRestrict_SQ001.NAOK == "Y") or (DietRestrict_SQ002.NAOK == "Y") or (DietRestrict_SQ003.NAOK == "Y"))

❗ Vos réponses doivent être différentes, et vous devez les classer dans l'ordre.
❗ Veuillez sélectionner 4 réponses maximum
Numérotez chaque case dans l'ordre de vos préférences de 1 à 4

_____ Prix
_____ Goût
_____ Impact environnemental/durabilité
_____ Valeur nutritive

Veuillez partager tout commentaire ou réflexion supplémentaire sur la consommation et la production de viande :

Veuillez écrire votre réponse ici :

MTurk Code

Veuillez saisir le code suivant dans MTurk :

T{if(!is_empty(MTurkCode),MTurkCode,1*rand(357382, 908173))}

Merci pour votre participation!

Si vous avez des questions sur le sondage, n'hésitez pas à communiquer avec Pierre Soudry (pierre.soudry@mail.mcgill.ca) ou la professeure Mary Doidge (mary.doidge@mcgill.ca).

Si vous avez des préoccupations ou des plaintes d'ordre éthique concernant votre participation à cette étude et que vous souhaitez parler à quelqu'un qui ne fait pas partie de l'équipe de recherche, veuillez contacter le directeur associé, éthique de la recherche au 514-398-6831 ou lynda.mcneil@mcgill.ca en citant REB numéro de dossier 22-08-125

Envoyer votre questionnaire.
Merci d'avoir complété ce questionnaire.