NOVEMBER, 2023

The Role of Warm Glow and Temporal Framing in shaping Plant-Based Meat choices

WAGENINGEN
UNIVERSITY & RESEARCH

Fra', Samuele

Master Thesis Marketing and Consumer Behavior (MCB80424)

30 Ects

Student:

Samuele Fra', 1308254

Msc Programme:

Sustainable Business and Innovation (MME-A)

Chair group:

Marketing and Consumer Behavior (MCB)

Supervisor:

Dr. Ilona de Hooge

Second reader:

Maede Amini

Co-supervisor:

Claudio Soregaroli

Wageningen University & Research

Date:
22th November 2023

Abstract

In a world facing pressing environmental challenges, the agri-food sector's contribution to greenhouse gas emissions has come under scrutiny. But what if there is the possibility to consume foods with a lower carbon footprint? This study delved into the realm of sustainable food consumption, with a specific focus on plant-based meat. It aimed at understanding how temporal framing, in conjunction with consumers' personal values, can address the low consumption of plant-based meat, thereby increasing their purchase intention. Particularly, the study employed both short-term and long-term messaging strategies, with the goal of eliciting "anticipated warm glow" – a sense of joy and satisfaction in consumers engaged in pro-social behavior. Additionally, the study tested how personal values (egoistic, social-altruistic, and biospheric) moderate the relationship between temporal framing and anticipated warm glow. The study, shedding light on the complex dynamics of consumer decision-making, aims to contribute the literature on the use of temporal framing in sustainable food consumption.

The experiment (251 participants) manipulated short-term, long-term, or no temporal message (control) and examined how they affect purchase intention of plant-based meat. The results revealed that both short-term and long-term were more effective than no temporal messages. Furthermore, the research illuminated the role of personal values, particularly the influence of social-altruistic values on anticipated warm glow, who exhibited lower levels of "Personal Satisfaction". The interaction between short-term messages and biospheric values also emerged as a significant driver, increasing purchase intention for plant-based meat products. These findings offer valuable insights for food marketers and policymakers seeking to promote sustainable food choices and encourage individuals to consider the broader societal and environmental impacts of their dietary decisions.

Keywords: Temporal framing, plant-based meat, anticipated warm glow, personal values, sustainable food consumption

Table of Contents

The role of Warm Glow and Temporal Framing in shaping Plant-based Meat choices

Introduction

In the recent years, there has been an increasing pressure on our food system, leading to a growing demand by final consumers to shift the current food production and consumption practices (Hoek et al., 2021). Among all human activities, food production and consumption have a significant environmental footprint and play a substantial role in driving global environmental changes. Agriculture alone accounts for one-third of global greenhouse gas emissions, with animal-based foods identified as major contributors (Aleksandrowicz et al., 2016; Poore, 2018). Indeed, the current food production, supply and consumption rely on fossil energy fuel, chemicals, long-distance transport, and high consumption of animal-based foods, and it does not fit the present and future human needs (FAO, 2010). Consequently, the United Nations identified "Responsible production and consumption" as one of the goals of the 2030 Agenda for Sustainable Development (Lim, 2012). As a result, people are becoming more concerned about sustainability of the agri-food sector, affecting the demand of more environmentally friendly methods of food production and consumption (Poore, 2018).

From the perspective of consumption, consumers have the power to influence food demand by adopting more sustainable dietary choices (Culliford, 2020; De Boer, 2022). According to the Food and Agricultural Organization (FAO, 2010), sustainable diets are characterized by low environmental impacts while promoting food and nutrition security for the well-being of present and future generations. Given the widespread recognition that the current trajectory of animal-based food consumption is unsustainable, there is an urgent need for a transition towards plant-based diets (Culliford, 2020). Numerous studies have indicated that plant-based diets are among the most sustainable dietary choices (Chai et al., 2019; Filippin et al., 2023; Rosi et al., 2017). Notably, the research conducted by Filippin et al. (2023) has revealed a 44% lower environmental impact of a Vegan diet in comparison to a Mediterranean diet, which is widely recognized as one of the reference sustainable diet. This underscores that by embracing plant-based diets, consumers can contribute to mitigate the environmental impact associated with food production and promote a more sustainable and healthier future.

Among the different possibilities to reduce agri-food sector footprint and to change to a plant-based diets, plant-based meat offers a promising solution (Aleksandrowicz et al., 2016; "Feeding the Future: Plant-Based Meat for Global Food Security and Environmental Sustainability," 2020). Due to population growth, rising meat demand, and resource constraints, conventional meat production is inadequate to meet the necessary protein demand and sustainably provide food for the future population (Gaydhane et al., 2018). In this context, plant-based meat avoids both the cultivation of livestock and the inefficient conversion of plant protein into animal protein, offering numerous advantages for environmental sustainability. Several studies have applied a life cycle assessment to compare the environmental impact of conventional and plant-based meat, showing that the latter demands a lower amount of land, water and energy resources compared to conventional meat (Heller et al., 2018; Khan et al., 2019). This supports the idea that plant-based meat could serve as a solution to diminish the environmental footprint of the agrifood sector.

Despite the emergence of the plant-based meat sector during the last decade, consumption of plant-based meat remains relatively low. This is due to low consumers' acceptance of novel and unfamiliar food, such as plant-based meat (Tosun et al., 2020). Consumers' intention to purchase plant-based meat can be affected by the temporal psychological distance, which affects how individuals evaluate and perceive this innovative food option. (Hartmann et al, 2017; Onwezen, 2021; Taufik, 2018). It has been shown that temporal psychological distance affect consumers evaluations and how people perceive a certain event and product. This indicates that the way individuals view the consequences of their action (or purchase) is influenced by their perception of time, whether it is in the near (short-term) or distant (long-term) future (Kim et al., 2008; Liberman et al., 2007). Specifically, the current research aims at increasing the purchase intention of plant-based meat by leveraging temporal framing to address the low consumption of plant-based meat. Understanding how temporal psychological distance affects consumers' intention to purchase plant-based meat, shed new light on the role of temporal framing in consumers decision-making.

However, for a more pronounced escalation in plant-based meat consumption, it is crucial to recognize that personal values play a key role in consumer decision. Based on Schwartz (1977), personal values are defined as the core principles that guide individuals' behaviors and decision making. Their importance has been verified by Yong-Ki et al. (2014), identifying personal

values as a strong determinant on consumers' social responsibility and ecofriendly behaviors. Particularly, the current research considers the "Schwartz theory of basic values" in a pro-environmental context, with a focus on self-enhancement (egoistic value) and self-transcendence (social-altruistic value). In addition, biospheric value is also considered, as Stern and Dietz (1994) had emphasized the positive role of biospheric and social-altruistic values in acting pro-environmentally. In support of this, Jang and Cho (2022) have demonstrated the importance of social-altruism and egoism in the field of plant-based meat alternative consumption. Therefore, the current research will consider social-altruistic, egoistic and biospheric values as moderator in plant-based meat purchase intention.

Moreover, to better understand the consumer behavior, the current study relies on the role of positive emotion. In the context of sustainable food consumption, warm glow plays a key role (Taufik, 2014; Van Der Linden, 2015). Research has indicated that warm glow feeling shares a positive relationship with the intent to purchase ethical-labeled products such as Fair Trade and Organic, engendering a sense of moral contentment among individuals (Iweala et al., 2019; Ladhari, 2017). To evoke warm glow emotion within consumers, the current study hypothesized that temporal framing can be a promising solution. Depending on whether the message is near or distant future-focused, it may elicit different level of warm glow among consumers. The magnitude of warm glow is likely to be affected by the inherent level of altruism (Andreoni, 1990). However, existing research has separately explored the effects of temporal framing, personal values, and warm glow on pro-environmental behavior (Iweala et al., 2019; Ladhari, 2017; Tuafik, 2018). Considering the purchase intention of plant-based meat as a pro-social and environmental behavior, this study aims to bridge a gap in the literature. By collectively examining the influence of temporal framing, personal values, and anticipated warm glow on increasing the purchase intention of plant-based meat, the research offers valuable insights into the dynamics of consumer attitudes, contributing to the broader field of sustainable food consumption.

RQ: How does temporal framing, combined with personal values (egoistic, social-altruistic, and biospheric value), affect consumers' purchase intention of plant-based meat?

SRQ1: How can warm glow be elicited the most, through short-term or long-term message?

SRQ2: Do egoistic, social-altruistic, and biospheric values moderate this influence of temporal framing on warm glow?

Theoretical background

Temporal framing

Extensive research has demonstrated the efficacy of message framing effects across a variety of domains, mainly in the field of psychology and marketing (Cheng et al., 2011; Florence et al., 2022). The framing literature is quite vast and encompasses a wide range of theories that attempt to explain how people perceive and interpret information and message based on the way they are presented to them (Plous, 1993). At its core, framing is a behavioral changing tool. It highlights specific aspect of information through format that trigger different psychological processes, empathizing potential benefits or risks related to a decision. According to literature (Scheufele, 1999; Scheufele and Tewksbury, 2007), framing can have a significant impact on public opinion, attitudes, and behaviors, and understanding the ways in which information is framed can be a powerful tool for influencing decision-making processes, as people tend to respond positively to messages aligned with their values and desires. In the context of pro-environmental behavior, research identified several types of framing that were found to increase decision in favor of the environment (Cheng et al., 2011; Nabi, 2003; Nelson et al., 2021; Sapiains et al., 2016). Among them, the most used are positive/negative framing and gains/losses framing. Positive and negative framing emphasize positive or negative aspects of a message, such as highlighting the benefits of quitting smoking (positive), or the smoking-related disease (negative) (Moorman & Van Den Putte, 2008). Conversely, gains and losses are focused on potential advantages or disadvantages linked to a decision (O'Keefe & Jensen, 2007). An example is the emphasis of the positive outcomes of recycling (gain), and the missed opportunities of not doing this (losses).

Research has suggested that temporal framing is another promising strategy of promoting pro-environmental behavior (Herberz et al., 2023; Jones et al., 2016; Kim and Ahn, 2019). Temporal framing involves the presentation of information and actions in relation to time, encompassing how messages or concepts are positioned within a specific temporal context to mold people's perceptions, attitudes, and behaviors (Pounders et al., 2015; Stanley et al., 2021). Temporal framing relies on temporal psychological distance, which refers to the perceived proximity or remoteness of events or outcomes. Specifically, it pertains to how individuals

subjectively perceive and conceptualize time (Liberman et al., 2007). Temporal framing involves one dimension – future – distinguished by two temporal distances: near future and distant future (Liberman et al., 2007). Messages, that are framed in terms of near future, emphasized events that are closed in time (few weeks, a month). They are designed to create a sense of urgency and to encourage immediate action. An example is a message that emphasized the immediate reduction of plastic usage, to see an immediate impact in the area where we live. While distant future messages focus on events or outcomes that are expected to occur much later (few months, years) (McElroy & Mascari, 2007). They are mainly framed to evoke a sense of responsibility for a specific cause (Stanley et al., 2021). Opting for products that can be recycled is an example of making a positive change for the environment that will show its benefits over many years. By emphasizing present or future concepts, temporal framing can impact how individuals interpret information and take decisions. Thus, the current research considers temporal framing as a dimension of psychological distance.

In the context of pro-environmental behavior, different studies have shown the role of perceived temporal psychological distance in affecting consumers' behavior (Kim and Ahn, 2019; Liberman et al., 2007). Research have shown that the threats of climate change are perceived distant on different dimensions: temporal, social, and geographical (Spence et al., 2011). Specifically, Jones et al. (2016) has demonstrated that individuals in a proximal message condition perceive climate change as more certain and have stronger intentions to act compared to distant messages. In support of this study, Kim and Ahn (2019) studied the correlation between temporal psychological distance and pro-environmental behaviors in American and south Korean universities. Their study particularly explored how messages emphasizing distant and near-future scenarios influenced the adoption of low-consumption light bulbs. The results showed that individuals exhibited a more positive attitude towards this behavior when they perceived future effect of their actions as temporally more proximal. Similar results were obtained by Pavey and Churchill (2017). They examined the the influence of temporal framing on snacking behavior. They compared the effects of emphasizing immediate health benefits versus long-term benefits. Participants exposed to the immediate health benefits condition reported snacking less frequently than those in the long-term health benefits condition.

Research has consistently shown that individuals tend to respond more positively and exhibit stronger intentions to act when issues are framed with immediate consequences rather than distant messages (Ingenbleek et al., 2015). This has been demonstrated in studies related to

pro-environmental behaviors, and health-related decisions (Kim and Ahn, 2019; Pavey and Churchill, 2017). Building upon these findings, the current research focuses on applying similar principles to the context of plant-based meat consumption. Given the demonstrated impact of short-term framing on individuals' attitudes and behaviors in previous studies, we hypothesize that short-term messages will have a greater influence on the purchase intention of plant-based meat compared to long-term messages.

In the light of the above, the following hypothesis are proposed:

Hypothesis 1: temporal framing will influence the purchase intention of plant-based meat.

Such that:

Hypothesis 1a: Short-term messages will generate a greater purchase intention of plant-based meat compared to long-term messages.

In the present context, when individuals encounter a plant-based meat accompanied by a temporal message, whether short-term or long-term, they are likely to perceive that their choice positively contributes to environmental sustainability and the well-being of future generations. As a results, they may show higher purchase intention of plant-based meat compared to a situation where no temporal message is present.

Hypothesis 1b: Short-term messages will generate a greater purchase intention of plant-based meat compared to no temporal messages.

Hypothesis 1c: Long-term messages will generate a greater purchase intention of plant-based meat compared to no temporal messages.

Warm glow

The link between temporal framing and purchase intention of plant-based meat can be elucidated through the concept of warm glow. Andreoni (1990) was the first one referring to the positive feeling named "warm glow of giving". Accordingly, it is defined as the enjoyment derived from acting pro-socially, without expecting anything in return. Clark et al. (2003) further defined "warm glow" as the personal satisfaction arising from an activity independent

of its impact. However, the current research considers the anticipated warm glow, defined as the positive feeling that a person expects to experience as a result of engaging in a behavior that they believe will have a positive impact on others or the environment. This feeling can serve as a powerful motivator for prosocial behavior. Indeed, research has shown that people are more likely to engage in actions that benefit others when they experience anticipated warm glow (Van Der Linden, 2018). For example, engaging in environmentally friendly actions, such as choosing locally grown and produced foods, is likely to generate a warm glow feeling due to the perceived positive impact on the local community and environment.

Recently warm glow has gained great interest in several domains, spanning from psychology to experimental economics and marketing (Bhattacharya et al., 2020; Dreyer et al., 2023; O'Brien & Kassirer, 2018; Van Der Linden, 2018). While the primary emphasis has centered on the connection between warm glow and prosocial conduct (Andreoni, 1990; Crumpler & Grossman, 2008), several contemporary investigations have delved into the impact of warm glow on pro-environmental behavior (Abbott et al., 2013; Hartmann et al., 2017). Few studies have specifically delved into the relationship between warm glow and food choices (Bennett, 2003; Boobalan et al., 2021). Boobalan et al. (2021) used warm glow feeling as an antecedent of the organic consumption, showing a positive influence. Building on the concept of anticipated warm glow in the context of food choices, recent interest has grown in comprehending how warm glow shapes pro-environmental food choices. However, the association between temporal framing and food purchase intention, mediated by warm glow, remains unexplored. To address this gap, our study aims to investigate how temporal framing influences the purchase intention of plant-based meat—widely perceived as a pro-environmental behavior—with anticipated warm glow acting as a mediator in this relationship.

Schneider et al. (2017) suggest that message framing can evoke anticipated positive emotions, such as the "warm glow", particularly when individuals engage in pro-environmental actions. As highlighted earlier (Andreoni, 1990; Van der Linden, 2018), the concept of anticipated warm glow often arises when individuals experience a sense of personal satisfaction from contributing to society. Building upon this understanding, the current research posits that temporal framing, being an integral component of message framing, is likely to induce anticipated warm glow in individuals involved in actions that benefit society.

Hypothesis 2: temporal framing will influence the feeling of anticipated warm glow in consumers' mind.

such that:

As previously noted, temporal framing operates on temporal psychological distance, encompassing both near and distant futures. However, the impact of short-term (near future) and long-term (distant future) messages on the elicitation of warm glow emotion remains unexplored in the existing literature. In light of this gap, the current research posits that when consumers encounter temporal messages emphasizing the short-term benefits of consuming plant-based meat, they are likely to experience higher anticipated warm glow. This hypothesis is based on the premise that short-term messages, highlighting immediate advantages and tangible outcomes, have the potential to forge a more immediate emotional response compared to message with no temporal indication. In this context, the temporal proximity of the benefits emphasized in short-term messages may evoke a stronger sense of warm glow compared to messages with no temporal indication.

Hypothesis 2a: short-term messages will lead to a higher feeling of anticipated warm glow compared to no temporal messages.

Similarly, when consumers experience temporal messages that highlight long-term benefits related to plant-based meat consumption, they may anticipate a higher sense of warm glow compared to scenarios with no temporal message. The idea is that consumers might experience a moral satisfaction after their purchase, envisioning the long-term positive impact on society or the environment (Nunes & Schokkaert, 2003). This stands in contrast to situations where there is no temporal message, leaving their impact not envisioned.

Hypothesis 2b: long-term messages will lead to a higher feeling of anticipated warm glow compared to no temporal messages.

The existing literature has not investigated which temporal messages is more effective in eliciting anticipated warm glow in consumers. However, consistent finding in consumer behavior literature has shown that consumers tend to favor instant gratification over future benefits (Ingenbleek et al., 2015; Lynch & Zauberman, 2006). With this in mind, we propose that consumers exposed to short-term messages might feel a higher anticipated warm glow

compared to those facing long-term messages, primarily due to the instant rewards associated with their actions.

Hypothesis 2c: short-term messages will lead to a higher feeling of anticipated warm glow compared to long-term messages.

Personal values

Personal values play a vital role in warm glow experiences, notably impacting sustainable consumption and purchase intentions (Hartmann et al., 2017). They are the core principles that guide individuals' behaviors and decision-making. The current research considers the "Schwartz theory of basic value", focusing on the sphere of egoistic (self-enhancement) and altruistic values (self-transcendence) (Schwartz, 1977). Stern and Dietz (1994) expanded this theory, introducing a third fundamental value that shapes human attitudes and behaviors linked to environmental consciousness, named biospheric value. Egoistic individuals prioritize their own interests and well-being, often considering self-interest as the driving factor behind their decisions and actions. On the other hand, social-altruistic values give precedence to the welfare of others and society, considering the consequences of their actions on present and future generations. According to Stern (2000), individuals with social-altruistic values view both others and environment through a moral lens. While biospheric values encompass a profound and intrinsic concern for nature and environment. Those with biospheric values base their actions on the potential consequences on nature and environment.

When it comes to pro-environmental behaviors, different individuals have different experience of warm glow. This depends on their personal value (egoistic, social-altruistic or biospheric) and the type of message they are facing. For example, individuals driven by egoistic motives might participate in environmentally friendly actions when such actions are aligned with their immediate interests. While social-altruistic individuals may be more inclined to engage in pro-environmental behaviors due to their concern for the well-being of others and community. In support of this, in their study Kim and Ahn (2019) have demonstrated that the effectiveness of temporal framing in eliciting pro-environmental behavior is influenced by personal values. As mentioned before, the study compared participants from South Korea and United States. It considered their cultural backgrounds: the American culture more individualistic (egoistic value), while the south Korean more collectivistic (social-altruistic value). This led to the

results that short-term messages were found to be more effective on egoistic individuals, while long-term messages on social-altruistic individuals.

Hypothesis 3a: short-term messages evoke a higher level of anticipated warm glow in egoistic individuals compared to social-altruistic ones.

Hypothesis 3b: long-term messages evoke a higher level of anticipated warm glow in social-altruistic individuals compared to egoistic ones.

People who strongly embrace biospheric values shape their actions according to the potential effects of their behavior on nature and environment (De Groot & Steg, 2007; Zhang et al., 2020). In contrast to consumers guided by an egoistic value orientation, those with a biospheric value orientation are more responsive to messages that emphasize environmental messages (Vinzenz et al., 2019). However, the present study directs its attention towards temporal messages (both short- and long-term) that underscore the environmental advantages of plant-based meat consumption. Consequently, individuals who hold biospheric values will evaluate the efficacy of both short-term and long-term messages, as long as they accentuate environmental benefits. Hence, in the context of the current study, we do not expect different level of warm glow, whether the message is short- or long-term framed. For this reason, concerning biospheric value, no hypotheses have been formulated.

Effect of warm glow on purchase intention

When making a purchase decision, consumers often try to anticipate the emotional consequences of their choices (Mellers & McGraw, 2001). As it has been previously noted, emotions play a key role in driving individual behaviors and consumers' decision making. Positive emotions, such as warm glow feeling, have been found to guide green-product purchase (Hartmann & Apaolaza-Ibáñez, 2012; Wang et al., 2022). Consistent with this, a prior study demonstrated a positive correlation between consumers' intent to engage in sustainable behavior by reducing meat consumption and their emotional responses (Taufik, 2018).

The impact of warm glow on fair trade products and pro-environmental claims has been explored by Iweala et al. (2019). And it has been observed a positive correlation among warm glow and purchase intention of both fair-trade products and pro-environmental claims. This

intention can be seen as pro-environmental behavior. Therefore, the current study considers the intention to purchase more plant-based meat as a pro-environmental behavior. Research have shown that acting pro-environmentally is intrinsically rewarding. And intrinsic rewards have been proven to elicit warm glow. We argue that if the intention to purchase plant-based meat is seen as a pro-environmental behavior, a warm glow feeling will be experienced when consumers have the intention to purchase plant-based meat.

Hypothesis 4: the stronger the anticipated warm glow, the higher the purchase intention of plant-based meat.

Theoretical framework

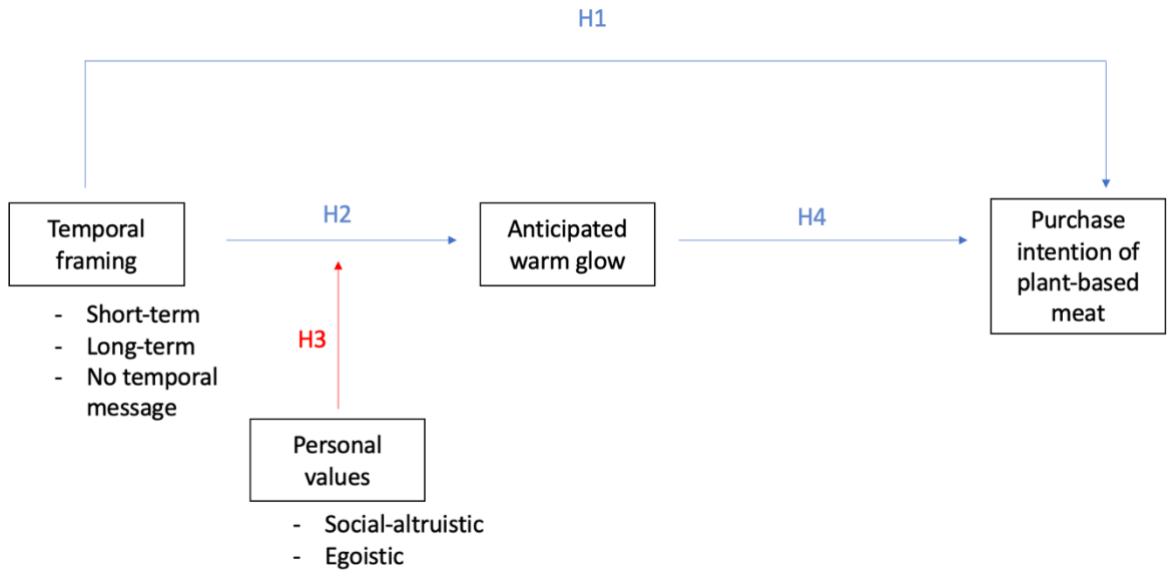


Figure 1: theoretical framework. Temporal framing is the independent variable (short-term, long-term, no temporal message), one dependent variable is identified as purchase intention of plant-based meat, and one mediator called "anticipated warm glow". Additionally, two moderators defined as personal values (social-altruistic and egoistic) have been considered to moderate the effect of message framing. Biospheric value are not included because we suppose that individuals holding this personal value will not perceived different level of anticipated warm glow whether the message they will face.

Methods

The primary goal of this research is to identify the most effective messaging strategy for increasing consumers' purchase intentions of plant-based meat. Specifically, this study aims to assess which temporal framing (short-term or long-term) is more influential in affecting purchase intentions, while keeping consumers' personal values constant (egoistic, social-altruistic, biospheric values). To achieve this goal, an experiment was conducted where each participant was randomly assigned to one of the messaging manipulations related to plant-based meat products. Prior to the main experiment, a pre-test was carried out to confirm whether the various manipulations were perceived as temporal messages.

Pre-test

Participants and design

A pre-test was carried out to assess participants' understanding of various temporal messages, including short-term, long-term, and a control group with no temporal message. Two sets of messages were used to verify which temporal messages were the most effective. This pre-test aimed to ensure the reliability and validity of our message manipulations before the final distribution (Hu, 2014). A small sample of 12 participants was involved using a within-subject design. The sample size was chosen for the feasibility of the pre-test and to evaluate participants' message perception. Each participant experienced all three manipulations for both sets of messages: short-term, long-term, and no temporal message (control group). Participants for the pre-test were recruited using a convenience sampling method.

Procedure and variables

Upon entering the pre-test, participants received a welcome message that introduced the researcher, the affiliated university, and the study's goals. After the welcome message, participants received a brief introduction wherein the experiment's anonymity was guaranteed. Within this introduction, participants were requested to consent to the privacy terms and confirm that they were at least 16 years old. To set the context for the experiment, participants were presented with a visual scenario:

"In this short questionnaire, you will have to picture yourself in your favorite supermarket doing grocery for meat products."

Participants viewed images of a meat display counter, featuring both conventional meat and plant-based meat products. The picture was separated into two parts – one side for "conventional meat" (named "Raw meat" in figure) and one for "plant-based meat". Above the plant-based meat section, a temporal message was displayed. Each participant was exposed to all three temporal messages to evaluate their understanding and perception of these messages. They initially encountered the first set of temporal messages, presented in a random order, followed by the second set of temporal messages, which were also presented in a random order. In the Appendix 1, the entire pre-test can be found.

To enhance participants' immersion in the supermarket scenario, a descriptive message outlining the situation was presented:

"Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:"

The initial set of messages included the following messages. For the short-term manipulation, participants saw a sign saying:
"Make an eco-friendly choice today: choose plant-based meat to reduce our carbon footprint."

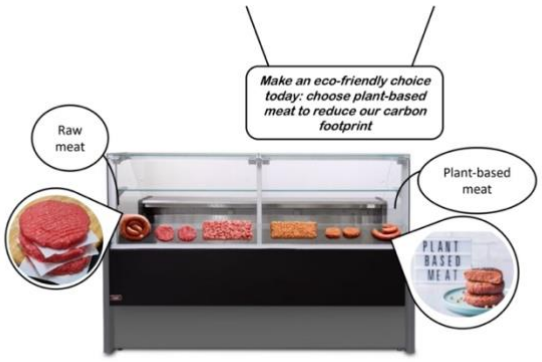


Figure 2: Short-term message, first set of messages.

For the long-term manipulation, participants saw a sign saying:
"For a sustainable future: choose plant-based meat to reduce our carbon footprint."

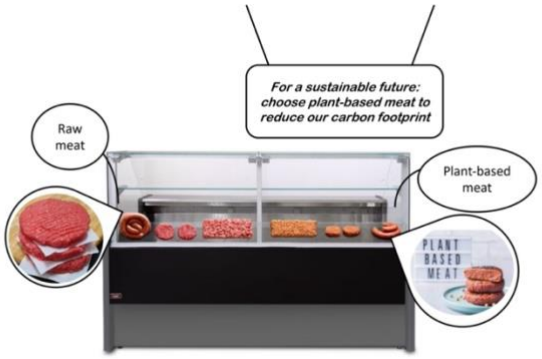


Figure 3: Long-term message, first set of messages.

While the No temporal message (control) was:

"Choose plant-based meat to reduce our carbon footprint."

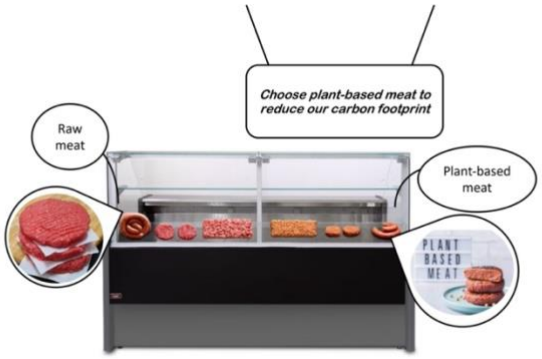


Figure 4: No temporal message, first set of messages.

While the second set of messages was the following. Short-term manipulation was:

"Join the eco-movement now: choose plant-based meat to tackle climate change."

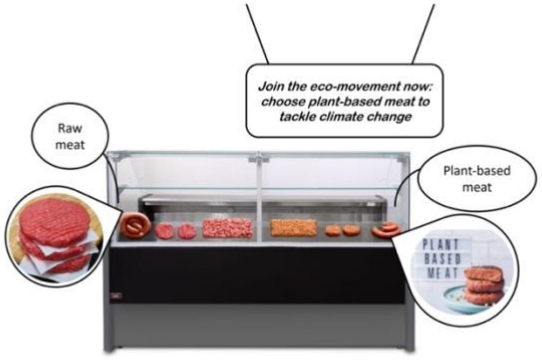


Figure 5: Short-term message, second set of messages.

The long-term manipulation was:

"Build with us a greener tomorrow: choose plant-based meat to tackle climate change."

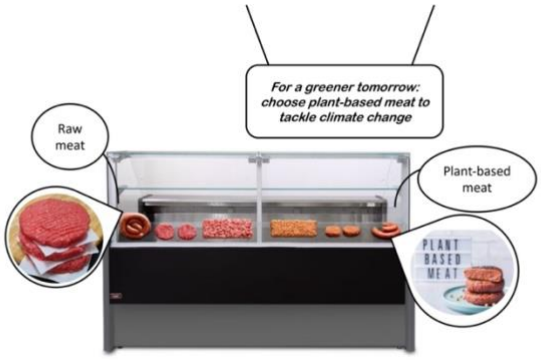


Figure 6: Long-term message, second set of messages.

And the No temporal one was:

"Choose plant-based meat to tackle climate change."

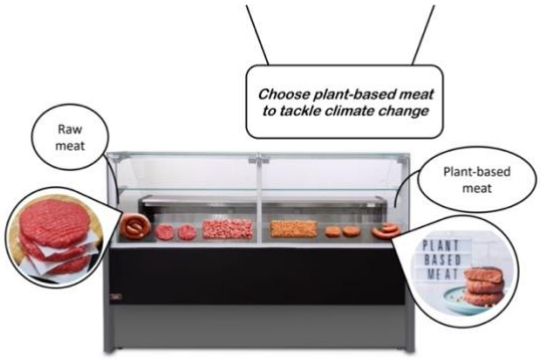


Figure 7: No temporal message, second set of messages.

To test and verify the validity of each manipulation, each picture was combined with a question that asked: "In your view, what time did the message focus upon?" and the respondents had to answer on a 7-point Likert scale ranging from 1= "now" to 7= "in the far future", plus 8= "there is no time indication".

Next, we assessed consumers' perceptions regarding the image of the meat counter. The image was displayed without the temporal message, and participants were asked a series of questions. The questions explored aspects such as clarity, understandability, appeal, realism, description of a supermarket setting, and whether the image featured a different product.

After completing the survey items, some demographic questions were asked regarding participants' gender, age, and nationality. Finally, the opportunity to provide open comments and advice was provided.

Results Pre-test

As previously mentioned, two different sets of three messages (short-term, long-term, and no temporal) were tested to determine the most effective set. A repeated-measures ANOVA was conducted to assess whether there were significant differences in how the messages were perceived. The answers to the question "In your view, what time does the message focus on?" were used as the dependent variable, while short-term, long-term, and no temporal messages were used as independent variables. The analyses were initially conducted for the first set of messages and subsequently for the second set. Paired Sample T-tests were conducted to examine whether there were significant differences between the messages within the same set. Based on these analyses, the most effective set of messages was selected. Following this, One-Sample T-test was employed to examine the respondents' perceptions of the meat counter image.

First set

Regarding the first set of messages, the analyses were performed using the answers to the question "In your view, what time does the message focus on?" as the dependent variable, and the three different types of messages as independent variables (Short-term, Long-term, and no temporal). The results indicated that the temporal manipulations were effective. The analyses were conducted excluding the value 8 (indicating "no time indication"), as our focus was on the impact of temporal indications. This approach ensured the accuracy of the mean and standard deviation for the different messages. As a result, only 9 out of the 12 responses were used in the analysis, excluding three participants who responded with 8 ("no time indication"). A statistically significant difference was found in how participants perceived the three temporal messages (F (2) = 7.332, p =.005).

The results of the Paired Sample T-tests comparing the three combinations of temporal messages (Short-term—Long-term, Short-term—Control, Long-term—Control) revealed

significant insights into how participants perceived these messages. Comparing Short-term and Long-term manipulation, a statistically significant difference was identified (p=.003). Short-term messages (M=1.58, SD=1.1165) emphasized immediacy, while long-term messages (M=4.50, SD=2.276) projected a distant future perspective, showcasing a significant difference in individuals' perception of time horizons. Although only 9 participants out of 12 were considered, the Paired Sample T-test among long-term and no temporal messages showed statistically significant differences. Long-term messages (M=4.33, SD=2) were aligned with a clear future-oriented temporal focus, while no temporal messages (M=2.33, SD=1.414, p = .040) exhibited a perceptual bias toward the present. No significant difference was observed between Short-term and no temporal message (p = .179). Both Short-term (M=1.78, SD= 1.302) and no temporal message (M=2.33, SD=1.414) were generally perceived as having a short-term temporal focus. However, a quarter of participants (3 out of 12) interpreted the no temporal message as "8 = no time indication". This suggests that while some participants may have found the no temporal message ambiguous, a consistent segment interpreted the message as intended, validating its use.

In conclusion, our comprehensive analysis of the first set of messages confirms the effectiveness of all three message manipulations (Short-term, Long-term, No temporal). The exclusion of responses indicating "no time indication" ensured the integrity of our analyses, allowing us to discern significant differences among how participants perceived these temporal messages.

Second set

The results of the second set of messages showed similar patterns to the first set. The independent variables included temporal manipulations (Short-term, Long-term, and No temporal), and the dependent variable was participants' perception of the message's temporal focus, excluding the value 8 ("no time indication"). This time, eight out of 12 responses were used, as four participants selected value 8 ("no time indication"). The repeated ANOVA analysis showed a marginally significant result (F (2) = 3.678, p = .052, η^2 = .344) To explore these trends in the second set of messages, we performed Paired Sample T-tests.

In the second set, the Paired Sample T-tests mirrored the significance levels observed in the first set of messages. Participants' perceptions of short-term and long-term messages showed

a significant difference (p = .013), with short-term messages (M=1.67, SD=1.155) reflecting the present and long-term messages (M=4.08, SD=2.314) focusing on the future. In the next two analyses, only eight participants were considered due to four responses of 8 ("no time indication") in the no temporal message. The comparison between Long-term and no temporal messages revealed a marginally significant difference (p = .096), with Long-term messages (M=4.13, SD=1.808) leaning toward the future, and no temporal messages (M=2.50, SD=1.414) toward the present. The comparison between Short-term and no temporal messages did not yield a significant difference (p = .451). Both were generally perceived as having a short-term focus, with means of 2.00 (Short-term) and 2.50 (No temporal). Notably, 4 out of 12 participants interpreted the No temporal message as 8 ("no time indication"), as expected. Consequently, we retained the no temporal message as a valid condition.

Features analysis

To assess participants' perception of the meat counter image, a One-Sample T-test was conducted. The variables "Clear" (M=4.56, SD=1.74) and "Understandable" (M=5, SD=1.414) showed statistically significant difference from the test value 7 (t = - 4.584, p <.001; And t = - 4.690, p < .001, respectively), indicating that participants found the descriptions slightly less clear and less understandable on average. However, these differences are relatively small and do not significantly impact the overall effectiveness of the image. The One-Sample T-test for the variable "Appealing" did not show statistically significant difference (t = - .519, p =.616) between the mean rating (M=3.70, SD=1.83) and the test value of 4. Participants' ratings for this variable are not significantly different from 4, suggesting that the pictures were perceived as neither unappealing nor appealing, aligning with our goal of avoiding bias. The variables "Realistic" (M=4.30, SD=2.00), "Supermarket setting" (M=3.70, SD=2.26), and "Different products" (M=4.92, SD=1.98), were rated slightly lower than the test value of 7 (t = - 4.263, p = .002; t = -4.611, p = .001; and t = -3.654, p = .001, respectively). While these differences were statistically significant, it is important to note that the ratings remained close to the intended value. Participants found these aspects to be only marginally less realistic or different from the expected value. In summary, the results affirm that the meat counter image was effective in conveying the desired message and scenario. The image was reasonably clear, understandable, and neutral in appeal, which indicates that it met our objectives. While there were slight statistical differences in ratings for realism and specific components of the image,

these differences can be considered minor and do not compromise the overall effectiveness of the visual representation.

Discussion

After conducting the necessary analyses, we concluded that both sets of messages were generally perceived as intended. Short-term and long-term messages consistently exhibited significant differences in participants' perceptions, with short-term messages evoking associations with the present moment and long-term messages projecting a future perspective. No temporal messages in both sets were primarily seen as present-focused, although a segment of participants interpreted the no temporal message as intended: "no time indication". The first set of messages showed more pronounced difference in message perceptions than the second set. Therefore, in the main experiment the first set of messages was used.

Overall, the meat counter image was perceived as intended. Participants ratings for the key attributes of the image matched our design objectives. The image successfully communicated the desired scenario, with participants finding it reasonably clear and understandable, while maintaining a neutral level of appeal. Similar to the messages, the image provided a clear and understandable representation, and any variations in the perception of specific attributes did not hinder the overall effectiveness of the visual representation. Therefore, the image chosen for the main experiment remained consistent with the image used in the pre-test.

Main experiment

Participants and design

The main experiment aimed to examine the impact of short-term and long-term messages on the purchase intention of plant-based meat. After conducting the analyses of the pre-test, the first set of messages was selected for the main experiment. A between-subject design was adopted, where each participant was randomly assigned to one of three manipulations: (1) Short-term message, (2) Long-term message, or (3) No temporal message (Control group). The table (Table 1) below shows the distribution of the participants.

Manipulations	**N**	**%**
Short-term	86	33.6%
Long-term	84	32.8%
No temporal	77	30.1%
Missing	9	3.5%
Total	256	100%

Table 1: number of respondents in each manipulation (Short-term, Long-term, No temporal) and the number of respondents missing.

Participants were conveniently recruited distributing the survey through various online platforms, including Facebook groups (e.g., Wageningen student plaza, Survey exchange), LinkedIn, SurveySwap, SurveyCircle, and word-of-mouth. The survey was administered using the Qualtrics platform, accessible via a link or QR code. The sole eligibility criterion for participation was age, with participants required to be over 16 years old. To ensure data reliability, the survey was available in both English and Italian languages.

Out of the initial pool of 256 recruited participants, 251 successfully completed the questionnaire. The participants' ages had an average of 30.25 years (*SD*=12.98). The survey was filled out in two primary languages, with 144 participants responding in Italian (57.4%) and 107 in English (42.6%). The participants came from diverse national backgrounds, including 154 Italians, 30 Dutch, 11 Germans, 9 Greeks, 6 Americans, 27 individuals from other countries, and 14 cases where nationality was not specified. In terms of gender distribution, there were 109 males (44.1%), 135 females (54.7%), and three participants who chose not to specify their gender (1.2%).

Procedure and variables

Participants were presented with the option to select their preferred language, either English or Italian. Subsequently, they were greeted with a welcome message that provided an overview of the study's objectives, privacy terms, and an estimated duration (8 minutes) of the experiment in the preferred language. The primary focus of this study was to gain insights into consumer decision-making within a supermarket setting. Therefore, the goal was articulated as follows:

"In the current study, our goal is to gain a deeper understanding of consumer decision-making within a supermarket setting."

Before proceeding with the survey, participants were asked to provide informed consent for the storage and utilization of their responses for scientific research purposes. The only eligibility requirement was being at least 16 years of age. On the next screen, participants were immersed in the scenario:

"Imagine yourself doing your weekly groceries at the local supermarket. As part of your shopping list, you intend to purchase meat products. You walk through the shelves of the meat department to explore the supermarket's offerings. At this point, you come across the meat counter."

Following the scenario presentation, participants were presented with the image of a meat counter divided into two sections: "Conventional meat" on the left and "Plant-based meat" on the right. Above the plant-based meat section, a temporal message was displayed, while the control group encountered a non-temporal message. To mitigate the influence of pricing, all participants were exposed to the same prices. Participants were randomly allocated to one of the three manipulations: short-term, long-term, or no temporal message (control group). For the short-term message manipulation, participants saw a sign saying:
"Make an eco-friendly choice today: choose plant-based meat to reduce our carbon footprint."

The long-term manipulation featured the following sign:
"For a sustainable future: choose plant-based meat to reduce our carbon footprint."

While the No temporal message was:
"Choose plant-based meat to reduce our carbon footprint."

The entire experiment with the different three images used can be found in the Appendix 2.

Then the dependent variable, "Purchase intention of plant-based meat", was assessed. Participants were presented with the question: "Which meat product would you be most likely to buy?". They responded by selecting the counter representing their preferred choice. This preference was labeled as "General meat choice", indicating their primary choice between the two meat options. Additionally, they were asked to indicate their level of purchase intentions for both "the meat on the left" (Conventional meat) and "the meat on the right" (Plant-based meat) using a scale ranging from 1 to (*"I would definitely not buy this meat"*) to 7 (*"I would definitely buy this meat"*). These ratings were labeled as "Purchase intention of meat on the left (Conventional)" and "Purchase Intention of meat on the right (Plant)".

Following this, a series of questions was administered to collect data on "anticipated warm glow", "meat counter image perceptions", "personal values", and demographic information. The mediator, "anticipated warm glow", was measured first. It aimed to measure the emotional experience of pleasure and satisfaction derived from making a positive contribution to society, particularly in the context of sustainable food consumption and its environmental impact. It was measured by asking participants to estimate the degree of positive effect they would experience by acting sustainably (*"How do you image you will feel after having chosen the meat of your liking? Please select the answer that best represents your opinion.")*. Participants responded to ten items designed to measure their anticipated warm-glow using a seven-point Likert scale, with 1 = "strongly disagree" and 7 = "strongly agree". The items will include *"I will feel good about myself"* (Van der Linden, 2018), *"I will feel personally satisfied", "I will feel as if I have contributed my part to society", "I will feel as if I have bought a healthy product", "I will feel as if I have contributed my part to the well-being of others", "I will feel as if I have contributed my part for the good of next generations", "I will feel as if I have bought something tasty", "I will feel as if I have contributed my part to reduce carbon emission", "I will feel as if I have contributed my part to preserve natural resources"*, "*I will feel as if I have made a good bargain".*

A factor analysis was conducted to unveil underlying patterns within the dataset (KMO = 0.847, Bartlett's Test $p < 0.001$). Two distinct components were identified, each encompassing

five items. The first component, labeled “Social and Environmental Contribution”, includes items related to concerns for societal well-being, the welfare of others, and environmental considerations. The second component, denoted “Personal Satisfaction”, is more centered around personal accomplishments and preferences. The first component exhibited an Eigenvalue of 4.795, explaining 47.95% of the variance, while the second had an Eigenvalue of 2.044, explaining 20.44% of the variance. Collectively, these two components accounted for 68.39% of the total variance. Collectively the ten items were found to be reliable, with a Cronbach’s alpha coefficient 0.868. Furthermore, both the identified components exhibited high reliability, as indicated by Cronbach’s alpha coefficients of 0.941 and 0.774, respectively.

Items	**Social and Environmental Contribution**	**Personal Satisfaction**
1. *I will feel good about myself*	.212	**.653**
2. *I will feel personally satisfied*	.116	**.742**
3. *I will feel as if I have contributed my part to society*	**.836**	0.91
4. *I will feel as if I have bought a healthy product*	.173	**.651**
5. *I will feel as if I have contributed my part to the well-being of others*	**.848**	.063
6. *I will feel as if I have contributed my part for the good of next generations*	**.897**	.057
7. *I will feel as if I have bought something tasty*	-.459	**.803**
8. *I will feel as if I have contributed my part to reduce carbon emission*	**.931**	-.093
9. *I will feel as if I have contributed my part to preserve natural resources*	**.905**	.021
10. *I will feel as if I have made a good bargain*	.067	**.693**

Table 2: Pattern matrix of anticipated warm glow, with the two identified components (“Social and Environmental Contribution” on the left, “Personal Satisfaction” on the right) and their relative items.

Next, we evaluated how participants perceived the image of the meat counter. Participants viewed the same image with the same temporal message they had previously encountered. Subsequently, a series of questions were presented to them. Initially, a question regarding their message perception of the time frame was asked. Respondents were asked to rate it on a 7-point Likert scale, ranging from 1= "now" to 7= "in the far future", with an additional option of 8= "there is no time indication". To simplify data handling, responses in Italian and English were combined into a single variable labeled "Time Frame". Following this, a series of questions were used to analyze various aspects of the image, including clarity, understandability, appeal, realism, description of a supermarket setting, and whether the image featured different products. These variables were labeled as "Clear", "Understandable", "Appealing", "Realistic", "Describe market", "Different products".

Participants were then asked to complete a questionnaire consisting of 12 items designed to assess their personal values, specifically their orientation towards egoistic, social-altruistic, or biospheric values. A 7-point Likert scale was used to measure personal values, ranging from 1= "not at all" to 7= "very important". They were asked *"To what extent do you follow this value as a guiding principle in your life? Please select the answer that best represents yourself."* According to De Groot & Steg (2008), each value orientation was evaluated using four items. The egoistic value orientation was measured by assessing social power (control over others), material possession (wealth), leadership (the right to lead), and influence on people (and events). The social-altruistic orientation was measured through items related to equality (equal opportunity for all), global peace (absence of conflicts), social justice (addressing injustice), and help (helping other people in the community). Meanwhile, the biospheric value orientation was assessed based on pollution prevention, respect for the Earth, connection with nature, and environmental protection.

A factor analysis was conducted separately for each personal values - egoistic, social-altruistic, and biospheric values - to explore whether distinct components could be identified. The analysis for the egoistic value revealed the presence of two components: one encompassing item related to social power, possession, and leadership, and the other solely comprising the item "Influence on People". To further refine the egoistic value construct, a subsequent factor analysis was performed, this time excluding the "Influence on People" item. The results demonstrated the expected presence of a single factor that defined the variable "Egoistic value" (Table 3), with an Eigenvalue of 1.639 explaining 54.637% of the variance. Reliability analysis

was conducted twice, once including the item “Influence on People” and once excluding it. The first analysis indicated an initial Cronbach’s alpha of 0.481, showing a moderate level of reliability. The second showed an increased Cronbach’s alpha of 0.581. This increase indicates that the scale’s overall reliability improved, suggesting that “Influence on People” might measure a distinct construct from the other egoistic items.

Items	Component 1 (Egoistic value)
1. Control over others	**.719**
2. Material possession	**.784**
3. Leadership	**.713**

Table 3: Component matrix of Egoistic value.

In the case of social-altruistic value, the factor analysis revealed a clear one-factor solution, with an Eigenvalue of 2.029, explaining 50.732% of the variance. This component, named “Social-altruistic value” (Table 4), encompassed items related to concepts such as equality, global peace, conflict prevention, addressing societal injustices, and helping others. The Cronbach’s alpha value of 0.674 demonstrated a reasonable level of reliability.

Items	Component 1 (Social-altruistic value)
5. Equal opportunities	**.641**
6. Global peace	**.780**
7. Social justices	**.697**
8. Help other people	**.724**

Table 4: Component matrix of Social-altruistic value

For biospheric value, the factor analysis showed the presence of a single component with an Eigenvalue of 1.983, explaining 49.581% of the variance. However, upon examining the Component Matrix (Table 5), it was evident that the item “Protect environment and preserve for future generations” exhibited a negative relationship with the identified component, indicated by a negative value of -.154. This was in contrast to the positive relationships observed for the other items. Consequently, the so defined variable “Biospheric value” did not include the item “Protect environment and preserve for future generations”. To provide

additional evidence, the reliability analysis was performed twice: once with the inclusion of the item “Protect the environment and preserve it for future generations” and once with this item excluded. Notably, when the item “Protect the environment and preserve it for future generations” was omitted, the reliability significantly improved, resulting in a Cronbach’s alpha value of 0.724, in contrast to the previous value of 0.473. This indicates a good level of reliability.

Items	Component 1 (Biospheric value)
9. Pollution prevention	**.825**
10. Respect for Earth	**.819**
11. Connection with nature	**.781**
12. Environmental protection	-.154

Table 5: Component matrix Biospheric value

Demographic information, including age, gender, and nationality, was collected from participants. Information concerning participants’ frequency of grocery shopping was also gathered. They were able to choose among the following options: 1-never, 2-one day a week, 3-some days a week, 4-almost every day, or 5-every day of the week. In conclusion, participants had the opportunity to provide open remarks.

Results

Manipulation checks

A one-way analysis of variance (ANOVA) was carried out to determine whether a significant difference existed in the perceived temporal messages (short-term and long-term) between three groups: the control group, which did not receive a temporal message, and the groups exposed to short-term and long-term messages. The variable "Time Frame" was used as dependent variable, while the variable "Manipulation", indicating if the message was short-term, long-term, or no temporal message ("Control"), was used as independent variable. The results of the manipulation check closely aligned with those observed during the pre-test, indicating that participants could effectively distinguish among the three distinct messages.

The analyses were carried out while excluding the value 8 ("no time indication"). The one-way ANOVA unveiled a significant difference among the manipulations regarding participants' perceptions of the time frame, $F(2, 213) = 9.988$, $p < .001$. Subsequent post-hoc tests (Tukey's HSD) were employed to pinpoint specific differences between these manipulations. The comparison between short-term ($M = 2.63$, $SD = 1.851$) and long-term ($M = 3.84$, $SD = 1.550$) revealed that participants perceived a substantial difference in the time frame between these two manipulations ($p < .001$). Short-term differed marginally from the no temporal manipulation ($M = 3.25$, $SD = 1.674$, $p = .082$), suggesting that short-term messages were perceived as marginally more short-term than the no temporal message. The comparison between the no temporal and long-term manipulations did not reach statistical significance ($p = .111$). However, it is noteworthy that 12 out of 72 respondents (17%) in the no temporal manipulation selected the value 8 ("no time indication"). This suggested that a significant portion of individuals interpreted the message as lacking a specific time indication. This supported our conclusion that the three messages were generally interpreted as intended.

Features checks

A one-way ANOVA and One-Sample T-test were carried out to determine the validity and how the meat counter image was perceived. Specifically, both the analyses were performed for each feature: "Clear", "Understandable", "Appealing", "Realistic", "Describe market", "Different products". These variables were used as independent variable, while the variable "Manipulation" was used as dependent variable.

Participants consistently found the meat counter image to be both "Clear" and "Understandable". This perception was confirmed by the One-Sample T-test (t= 10.962, p<.001; t= 17.015, p< .001), which indicated that participants' ratings significantly exceeded the neutral level of clarity and understandability (Test value= 4). Furthermore, the one-way ANOVA provided evidence that participants' perceptions were consistent across three manipulations, with no significant differences observed (F= 0.181, p= .835; F= 0.716, p= .490). The one-way ANOVA showed no significant difference in participants' ratings for the "Appealing" feature across the three manipulations (F= 1.229, p= .294). However, the One-Sample T-test revealed that the image's average "Appealing" rating was significantly below the neutral value of 4 (t= -2.174, p= .031). This confirmed that the image was perceived as neither unappealing nor appealing, aligning with our goal of avoiding bias. The results of the one-way ANOVA tests showed that participants' ratings for the "Realistic", "Describe Supermarket", and "Different Products" features did not significantly differ among the three manipulations (all Fs < 1.50, all ps > .05). However, the One Sample T-Tests showed that participants average rating for "Realistic" and "Different Products" were significantly above the neutral value 4 (t= 3.829, p< .001; t= 3.086, p= .001, respectively). While the feature named "Describe Supermarket" was significantly below the Test value 4 (t= -2.573, p= .005). This suggested that participants found the image realistic and showing different products, while it did not effectively describe a supermarket setting.

Manipulation effect on Purchase intention of plant-based meat

Once we established the effectiveness of the temporal manipulations, our analysis delved into the influence of these messages on the dependent variable, "Purchase intention of plant-based meat". This investigation was primarily designed to examine the hypothesis that short-term messages will lead to higher purchase intention of plant-based meat compared to long-term messages (H1a). Additionally, we hypothesized that both short-term and long-term messages will have a higher purchase intention of plant-based meat than no temporal message (control) (H1b, H1c).

The measurement of "Purchase intention of plant-based meat" involved a combination of nominal and ordinal data. Respondents were presented with two questions: the first question pertained to their preferred purchase choice, offering the options of "meat on the left" (conventional) and "meat on the right" (plant-based), which provided nominal data. The second

question provided ordinal data since it required participants to rate their purchase intention for both options on a scale ranging from 1 ("I would definitely not buy this meat") to 7 ("I would definitely buy this meat"). To analyze this data, we employed two statistical tests: a Chi-square test and a one-way ANOVA. These tests were employed with the aim of revealing the influence of different temporal manipulations on participants' purchase intention for plant-based meat.

A Chi-square analysis was executed to explore the relationship between the independent variable "Temporal framing" (comprising short-term, long-term, and no temporal message) and the dependent variable "Purchase intention of plant-based meat", which were categorized into two nominal variables: "Manipulation" (Short-term, Long-term, and No temporal) and "General meat choice" (Conventional or Plant-based meat). The outcomes revealed no significant difference in the frequency of "Purchase intention" ("General meat choice") across various message manipulations ($\chi^2(2, 247) = 0.597$, $p = .742$). In essence, the majority of participants favored the conventional meat ("Meat on the Left"): with 61.5% choosing it compared to 38.5% opting for plant-based meat. Specifically, 64% in short-term, 58.3% in long-term, and 62.3% in the No temporal manipulation selected conventional meat.

To evaluate how different manipulations affect consumers' purchase intentions regarding conventional and plant-based meat, two separate one-way ANOVA tests were conducted. The independent variable in these analyses was labeled "Manipulation", while the two dependent variables were the responses to distinct questions: "To what extent would you purchase the meat on the left?" (conventional meat) and "To what extent would you purchase the meat on the right?" (plant-based meat). The results indicated no significant difference in purchase intentions for conventional meat across the various manipulations (Short-term, Long-term, No temporal message), with $F(2, 243) = 1.329$ and $p = .267$. Participants' responses displayed no significant variation between manipulations: Short-term ($M = 5.02$, $SD = 1.872$), Long-term ($M = 4.60$, $SD = 1.857$), and No temporal ($M = 4.99$, $SD = 1.915$).

The results for purchase intention regarding plant-based meat ("Meat on the right") revealed a statistically significant difference in purchase intention among the various manipulations ($F(2, 244) = 8.744$, $p < .001$). Subsequently, a Tukey Honestly Significant Difference (HSD) post-hoc test was conducted to identify the specific manipulations that differed significantly from each other. The analysis showed statistically significant differences between Short-term and No temporal ($p = .012$) and between Long-term and No temporal message ($p < .001$).

Specifically, the degree of purchase intention for plant-based meat in Short-term (*M*= 4.01, *SD*= 1.712) and in Long-term (*M*= 4.32, *SD*= 1.577) was significantly higher than the scores in the No temporal manipulation (*M*= 3.30, *SD*= 1.433). No significant difference was observed between Short-term and No temporal manipulation (p = .410).

In summary, the study provided support for H1b and H1c, as participants displayed increased purchase intention when exposed to short-term and long-term messages compared to messages without temporal framing. However, H1a was not supported, as the short-term message did not result in higher purchase intention for plant-based meat compared to the long-term message. Despite this, the analyses indicated a general preference for conventional meat, although there was an overall rise in purchase intention for plant-based meat.

Manipulation effect on anticipated warm glow

The manipulation was investigated to determine whether it influenced the mediator "anticipated warm glow". In this study, we hypothesized that temporal messages will affect "anticipated warm glow" (H2), such that: short-term and long-term messages will lead to higher feeling of anticipated warm glow compared to no temporal messages (H2a, H2b). And short-term messages will lead to a higher feeling of anticipated warm glow compared to long-term messages (H2c).

As a result of the factor analysis, "anticipated warm glow" was divided into two distinct components: "Social and Environmental contribution" and "Personal Satisfaction". These two components were tested individually by executing separate one-way ANOVAs. In both tests, the independent variable was "Manipulation," while "Social and Environmental Contribution" was the dependent variable for the first test, and "Personal Satisfaction" served as the dependent variable for the second test.

Considering "Social and Environmental contribution", the one-way ANOVA did not yield statistically significant evidence to conclude that the three different manipulations (short-term, long-term, no temporal) had a significant impact on the "anticipated warm glow" related to social and environmental contribution (F (2, 239) = 0.595, p= .552). In detail, the short-term manipulation (*M*= 3.38, *SD*= 1.69), long-term manipulation (*M*= 3.58, *SD*= 1.71), and no temporal manipulation (*M* = 3.65, *SD* = 1.62) did not exhibit significant differences. Similarly,

in the context of "Personal Satisfaction," the one-way ANOVA also revealed no statistically significant difference among the three different manipulations (short-term, long-term, no temporal) ($F(2, 243) = 0.652$, $p = .522$). Specifically, the short-term manipulation ($M = 4.88$, $SD = 1.21$), long-term manipulation ($M = 4.67$, $SD = 1.07$), and no temporal manipulation ($M = 4.77$, $SD = 1.28$) did not display significant variations. In conclusion, our analysis did not identify substantial differences in the level of "anticipated warm glow" experienced by participants after exposure to one of the manipulations. As a result, hypotheses H2, H2a, H2b, and H2c were rejected.

A Paired-Sample T-test was conducted to explore the differences between the two components of "anticipated warm glow", namely "Social and Environmental contribution" and "Personal Satisfaction". This analysis was carried out for each manipulation: short-term, long-term, and no temporal. It revealed significant differences between the two components ("Social and Environmental Contribution" and "Personal Satisfaction") in each manipulation (all ps <.001). In each manipulation, "Personal Satisfaction" was rated significantly higher than "Social and Environmental contribution". These findings suggested that participants consistently report higher levels of "Personal Satisfaction" compared to their perception of "Social and Environmental Contribution", regardless of the manipulation they were exposed to.

Anticipated warm glow effect on purchase intention of plant-based meat.

The current study is interested in the effect of the mediator "anticipated warm glow" on the dependent variable "purchase intention of plant-based meat". In particular, the current research has hypothesized that the stronger the anticipated warm glow, the higher the purchase intention of plant-based meat (H4).

A binary logistic regression was performed to examine the relationship between the dependent variable "General meat choice" and the two independent variables, "Social and Environmental contribution" and "Personal satisfaction". The complete model was statistically significant ($\chi 2$ (2, 241) = 93.919, $p < .001$, *Nagelkerke* $R^2 = 43.9\%$). In specific, the results showed that "Social and environmental contribution" had a significant positive effect on plant-based meat ($B = 1.075$, *Wald*= 58.517, $p < .001$). This suggested that an increase in "Social and Environmental contribution" was linked with higher odds of choosing plant-based meat. While "Personal satisfaction" had a significant negative effect on choosing "Plant-based meat", with a coefficient $B = -0.58$ (*Wald* = 10.91, $p < .001$) and with an odds ratio of 0.560. This suggested

that an increase in “Personal Satisfaction” was associated with lower odds of choosing “Plant-based meat”.

A multiple linear regression was performed to assess the relationship between the independent variables “Social and Environmental contribution” and “Personal satisfaction” and the level of purchase intention for conventional meat (“Meat on the left”). The results demonstrated the overall statistical significance of the regression model ($R = 0.209$, $F(2, 240) = 31.384$, $p < .001$). In general, both “Social and Environmental contribution” and “Personal satisfaction” collectively influenced the level of purchase intention for conventional meat. More specifically, “Social and Environmental contribution” had a negative effect on the purchase intention of conventional meat ($\beta = -.462$, $p < .001$), while “Personal satisfaction” had a positive impact on “Purchase intention of conventional meat” ($\beta = .373$, $p < .001$).

Another multiple linear regression was conducted with “Social and Environmental contribution” and “Personal satisfaction” as independent variables and the level of purchase intention for plant-based meat (“Meat on the right”) as dependent variable. The overall regression was statistically significant ($R = 0.291$, $F\ (2, 241) = 11.021$, $p < .001$). However, “Social and Environmental contribution” showed significance in predicting the choice of plant-based meat ($\beta = .315$, $p < .001$), while “Personal satisfaction” did not have a significant effect ($\beta = -.078$, $p = .252$).

Based on the findings, the hypothesis that “the stronger the anticipated warm glow, the higher the purchase intention of plant-based meat” (H4) can be partially accepted, as “Social and Environmental contribution” was found to be significant predictor of plant-based meat choice. In conclusion, the multiple linear regression suggested that both “Social and Environmental contribution” and “Personal satisfaction” had different impacts on the purchase intention of conventional and plant-based meat. Specifically, both the independent variables were found to be significant predictors of conventional meat choice, with “Social and Environmental contribution” found to have negative influence and “Personal satisfaction” positive. Whereas “Social and Environmental contribution” was found to be the only predictor of plant-based meat, showing a positive influence on it.

Mediation analysis

In the current research, we assessed the extent to which mediators clarify the influence of manipulated "temporal framing" on the dependent variable "Purchase intention of plant-based meat". We conducted a mediation analysis using the PROCESS by Hayes to understand the role of these mediators in linking the manipulated independent variable, "Temporal framing", with the dependent variable. The analyses focused on participants' purchase intentions for two types of meat: "Conventional meat" (meat on the left) and "Plant-based meat" (meat on the right). To facilitate this analysis, we transformed the different manipulations into a dichotomous variable using dummy coding. The variable "Long-term" took the value of one for observations associated with long-term messages and zero for all other observations. The second new variable, "Short-term", took the value of one for observations linked to short-term messages and zero for all other observations.

Conventional meat

The first mediation analysis was performed for the "Conventional meat" ("meat on the left"). The direct effect of the manipulations on "Social and Environmental contribution" was not significant. In particular, the results revealed no significance for "Long-term" (b= -.0047, p= .9859), and for "Short-term" (b= -.2508, p= .3457) on the mediator "Social and Environmental contribution". The direct effect of the manipulation on "Personal satisfaction" was also not significant, as shown by "Long-term" (b= -.1136, p= .5350), and "Short-term" (b= .1454, p= .4257). Overall, these findings suggested that the different temporal messages had no effect on "Social and Environmental contribution" and "Personal satisfaction".

Next, the mediation process showed that the direct effect of "Social and Environmental contribution", on the "Conventional meat" was significant with b= -.5243, p< .001. Significance was also found in the direct effect of "Personal satisfaction" on the "Conventional meat", with b= .6137, p< .001. The direct effect of the manipulations on conventional meat showed no significance: "Long-term" (b= -.3659, p= .2265), and "Short-term" (b= .0241, p= .9362).

The indirect effect of the manipulations via "Social and Environmental contribution" on "Conventional meat" was not significant: "Long-term" (b= .0025, *95% CI* = -.27, .27), "Short-term" (b= .1315, *95% CI* = -.14, .40). Similar results were found in the indirect effect of

manipulations via “Personal Satisfaction” on “Conventional meat”, showing no significant effect: “Long-term” (*b*= -.0697, *95% CI* = -.29, .16), “Short-term” (*b*= .0893, *95% CI* = -.14, .33).

In conclusion, both the mediators “Social and Environmental contribution” and “Personal Satisfaction” did not mediate the relationship between the manipulation of “Temporal framing” and the choice of “Conventional meat” because the manipulations effect on the dependent variable “Conventional meat” was not significant.

Plant-based meat

The second mediation analysis focused on “Plant-based meat”. Specifically, it was found that the direct impact of the message manipulations on “Social and Environmental contribution” was not statistically significant. This was evident in the results, where neither “Long-term” (*b*= -.0307, *p*= .9081) nor “Short-term” (*b*= -.2767, *p*= .2969) had a significant effect on the mediator “Social and Environmental contribution”. Similarly, the direct effect of the manipulations on the mediator “Personal satisfaction” was also not significant, as indicated by “Long-term” (*b*= -.1107, *p*= .5431) and “Short-term” (*b*= .1483, *p*= .4141). In summary, these findings suggested that the different temporal messages had no direct effect on “Social and Environmental contribution” and “Personal satisfaction”.

Next, the mediation process showed that the direct effect of “Social and Environmental contribution”, on the “Plant-based meat” was significant with *b*= .3181, *p*<.001. However, the direct effect of “Personal satisfaction” on the “Plant-based meat” was found to be no significant, with *b*= -.1142, *p*= .2299. The direct effect of the manipulation on “Plant-based meat” showed significance for both “Long-term” (*b*= 1.0228, *p*< .001), and “Short-term” (*b*= .8374, *p*= .001).

The indirect effect of the manipulations via “Social and Environmental contribution” on “Plant-based meat” was not significant: “Long-term” (*b*= -.0098, *95% CI* = -.18, .16), “Short-term” (*b*= .0880, *95% CI* = -.26, .08). Likewise, the indirect effect of manipulations via “Personal Satisfaction” did not show statistical significance: “Long-term” (*b*= .0126, *95% CI* = -.04, .08), “Short-term” (*b*= -.0169, *95% CI* = -.10, .04).

In conclusion, both the mediators "Social and Environmental contribution" and "Personal Satisfaction" did not serve as mediators in the relationship between the manipulation of "Temporal framing" and the choice of the "Plant-based meat".

Personal values – Egoistic, Social-altruistic, and Biospheric value – moderating effect in eliciting anticipated warm-glow.

The current research expected that the impact of "temporal framing" on the "anticipated warm-glow" effect depends on the personal values (egoistic, social-altruistic, biospheric value) of each individual. It was expected that a short-term message would elicit higher level of anticipated warm glow in egoistic individuals (H3a), while long-term messages would evoke higher anticipated warm-glow in social-altruistic individuals (H3b). Furthermore, we anticipated that individuals holding strong biospheric values would be influenced by both short-term and long-term messages, since the temporal messages emphasize environmental benefits.

Multiple linear regressions were conducted to analyze the interaction between the three moderators named as "Personal values" (egoistic, social-altruistic, and biospheric value) on the mediator "anticipated warm glow" and on dependent variable "Purchase intention". Regression analyses were conducted without employing the PROCESS tool by Hayes. This was due to the limitation of allowing a maximum of two moderators in PROCESS. Instead, a multiple linear regression was executed, incorporating three moderators. Firstly, two multiple linear regressions were performed to test the effect of the moderators on the "Purchase intention", one for the meat on the left ("Conventional meat") and one for the meat on the right ("Plant-based meat"). Then others two multiple linear regression analyses were conducted to test the effect of moderators on the mediator "Anticipated warm-glow", one for the variable "Social and Environmental contribution" and one for "Personal satisfaction". To facilitate the analyses, we standardized the value of each moderator calculating the Z-scores. Then we used the same dummies variables used for the mediation analysis: the first dummy, called "Short-term", took the value one for observations linked to short-term messages and zero for all other observations. The second dummy variable, "Long-term", took the value of one for observations associated with long-term messages and zero for all other observations. In addition, six other variables, representing the interaction of the two dummies with the three moderators, were created

(“Short-term x Egoistic”, “Short-term x Social-altruistic”, “Short-term x Biospheric”, “Long-term x Egoistic”, “Long-term x Social-altruistic”, “Long-term x Biospheric”).

The first multiple linear regression considered the two dummies (“Short-term”, “Long-term”), the standardized values of each moderator (ZEgoistic, ZSocial, ZBiospheric), and the six interactions (“Short-term x Egoistic”, “Short-term x Social-altruistic”, “Short-term x Biospheric”, “Long-term x Egoistic”, “Long-term x Social-altruistic”, “Long-term x Biospheric”) as independent variables. While the variable named “Purchase Intention of Conventional meat” (“meat on the left”) was used as dependent variable. The results showed that the model was not statistically significant in predicting the dependent variable (R = 0.209, F (11, 231) = 0.96, p= .484).

A multiple linear regression was performed to examine the relationship between the dependent variable “Purchase Intention of Plant-based meat” (“meat on the right”), and the independent variables, indicating the two dummies, the standardized values of each moderator, and the six interactions. The complete model was shown to be statistically significant (R= .386, F (11, 232) = 3.698, p < .001). However, only three independent variables were found to be statistically significance in predicting the choice of plant-based meat: “Short-term” (β = .260, p < .001), “Long-term” (β = .298, p < .001), and “Short-term x Biospheric” (β = .272, p = .017). This suggested that the variables “Short-term”, “Long-term”, and “Short-term x Biospheric” had a positive correlation in predicting the “Purchase Intention of Plant-based meat”. However, the three moderators (Egoistic, Social-altruistic, Biospheric), taken individually, were found to be not statistically significance (β = .078, p < .500; β = -.029, p < .816; β = -.001, p < .996, respectively).

Two other multiple regression analysis were conducted to explore the effect of moderators (egoistic, social-altruistic and biospheric values) on the mediator “Anticipated warm-glow”, one for the variable “Social and Environmental contribution” and one for “Personal satisfaction”. The first analysis considered the “Social and Environmental contribution” as dependent variable, while the independent variables were the two dummies, the standardized values of each moderator, and the six interactions between the dummies and the moderators. The overall regression was found to be statistically significance ((R= .333, F (11, 227) = 2.57, p = .004). However, none of the independent variables were found to be statistically significance. The second multiple linear regression considered the “Personal satisfaction” as

dependent variable, while the independent variables were the two dummies, the standardized values of each moderator, and the six interactions between the dummies and the moderators. It showed statistical significance as well (R= .288, F (11, 231) = 1.893, p = .041). Nonetheless, only the moderator "ZSocial" was found to be significant with a β of -.319, and *p-value of* .015.

	Purchase Intention of conventional meat		Purchase Intention of plant-based meat		Social and Environmental contribution		Personal satisfaction	
	β	p	β	p	β	p	β	p
Short-term	.003	.971	**.260**	**<.001**	-.016	.829	.098	.197
Long-term	-.078	.314	**.298**	**<.001**	-.018	.809	-.009	.902
ZEgoistic	.105	.391	.078	.500	.128	.267	.190	.114
ZSocial	.054	.683	-.029	.816	-.157	.206	**-.319**	**.015**
ZBiospheric	-.108	.416	-.001	.996	.200	.116	.012	.925
Short-term x Egoistic	-.020	.844	.023	.815	.049	.608	-.108	.289
Short-term x Social-altruistic	.072	.542	-.084	.445	-.005	.959	.144	.211
Short-term x Biospheric	-.129	.282	**.272**	**.017**	.110	.334	.175	.137
Long-term x Egoistic	-.022	.808	.025	.770	.070	.436	.008	.930
Long-term x Social-altruistic	-.120	.253	.076	.443	.070	.493	.104	.307
Long-term x Biospheric	.082	.422	.056	.557	-.020	.840	-.012	.905

Table 6: results of the four multiple linear regression analysis. The rows indicate the different independent variables, while the columns the four different dependent variables. The highlighted boxes indicate when it was found significance.

In summary, results revealed that the effects of temporal messages on purchase intentions and anticipated warm-glow vary based on individuals' personal values. Our hypotheses, H3a and H3b, were not supported. H3a was rejected as the interaction between Short-term messages and Egoistic value did not significantly impact anticipated warm glow. Likewise, H3b was dismissed due to the absence of a significant interaction between Long-term messages and Social-Altruistic value. This suggested that no interactions played a role in predicting the level of anticipated warm glow. Nevertheless, our moderation analyses uncovered some significant patterns: individuals with Social-Altruistic values demonstrated significantly lower levels of "Personal satisfaction". Furthermore, those with Biospheric values and exposed to Short-term messages were more inclined to purchase "Plant-based meat".

Results summary

Presented below is a summary of the hypotheses and whether they were supported by the obtained data (Table 7). As observed, H1b and H1c were accepted as participants displayed higher purchase intention when exposed to short-term and long-term messages compared to messages without temporal framing. H1a was not supported, as the short-term message did not lead to higher purchase intention for plant-based meat compared to the long-term message. H2 was rejected since both the components of "anticipated warm glow" ("Social and Environmental contribution", "Personal Satisfaction") were not influenced by temporal messages. H2a, H2b, H2c were also rejected since no statistically significant difference was found between the three manipulations. H3a and H3b were also rejected as the "anticipated warm glow" was not affected by the pairing of short-term messages with egoistic values, neither by long-term messages with social-altruistic values. H4 could be partially accepted, as only one component of "anticipated warm glow" ("Social and Environmental contribution") was found to be significant predictor of plant-based meat choice.

Hypothesis	**Supported?**
H1a: Short-term messages will generate a greater purchase intention of plant-based meat compared to long-term messages.	Rejected
H1b: Short-term messages will generate a greater purchase intention of plant-based meat compared to no temporal messages.	Accepted
H1c: Long-term messages will generate a greater purchase intention of plant-based meat compared to no temporal messages.	Accepted

H2: temporal framing will influence the feeling of anticipated warm glow in consumers' mind.	Rejected
H2a: short-term messages will lead to a higher feeling of anticipated warm glow compared to no temporal messages.	Rejected
H2b: long-term messages will lead to a higher feeling of anticipated warm glow compared to no temporal messages.	Rejected
H2c: short-term messages will lead to a higher feeling of anticipated warm glow compared to long-term messages	Rejected
H3a: short-term messages evoke a higher level of anticipated warm glow in egoistic individuals compared to social-altruistic ones.	Rejected
H3b: long-term messages evoke a higher level of anticipated warm glow in social-altruistic individuals compared to egoistic ones.	Rejected
H4: the stronger the anticipated warm glow, the higher the purchase intention of plant-based meat.	Partially accepted

Table 7: the table shows when the different hypotheses were accepted, rejected, or partially accepted.

General discussion

According to the Food and Agricultural Organization (FAO, 2010), the agri-food sector is responsible for approximately one-third of global greenhouse emissions. With the world grappling with a severe climate crisis in recent decades, there is an urgent necessity to reduce these emissions (Aleksandrowicz et al., 2016; Poore, 2018). Concerning the agri-food sector, the responsibility extends to both food companies and consumers. While companies strive to find more sustainable production methods, consumers also play a key role by making informed choices that contribute in the reduction of emissions (Chander & Muthukrishnan, 2015). This study centered on consumers' intention to purchase plant-based meat, recognizing its potential as a sustainable dietary choice that minimizes environmental impact by offering an alternative to conventional meat. It assessed how temporal framing (short-term, long-term, and no temporal messages) influence consumers' purchase intentions for plant-based meat and their anticipated warm glow feeling. Moreover, it also considered the role of personal value - egoistic, social-altruistic, and biospheric values – in moderating the effect of temporal messages on the sense of anticipated warm glow.

The results showed that both short-term and long-term messages were more effective in driving plant-based meat purchase intentions than no temporal messages (control). However, the study did not determine which of these two was more effective. Anticipated warm glow manifested in two components, with "Personal satisfaction" yielding higher than "Social and environmental contribution". Individuals with social-altruistic values exhibited lower levels of "Personal satisfaction" (anticipated warm glow). While individuals with strong biospheric values tend to exhibit greater purchase intention for plant-based meat when exposed to short-term messages as opposed to long-term messages. Additionally, some relevant differences were found between the intention to purchase conventional and plant-based meat. Importantly, for conventional meat, feeling personally satisfied increased the intention to buy it, but caring about social and environmental aspects reduced it. In contrast, for plant-based meat, valuing social and environmental factors increased purchase intention.

Theoretical implications

The findings of this study have several theoretical implications within the context of sustainable food consumption. With an increasing interest in food sustainable practices, this study contributes to filling a critical gap. Specifically, it delves into interventions aimed at enhancing

the acceptance of plant-based meat, recognized as a key component of sustainable dietary choices. The intricate relationship between temporal framing, personal values, and purchase intentions for plant-based meat represents a novel exploration within the existing literature. Especially, it brings novelty exploring the relationship among temporal messages and the feeling of anticipated warm glow in a context of food sustainable choices.

The study's results underscored that both short-term and long-term messages significantly increased the purchase intention for plant-based meat compared to scenarios with no temporal messages (control). This supports the hypothesis that consumers' behavior is influenced by temporal framing. This finding enriches the literature exploring the role of time in message framing, indicating that individuals exposed to messages with a temporal indication exhibit a higher intention to act pro-environmentally and socially. Despite the observed influence, the study did not reveal distinctions between the short-term and long-term effects. This finding contrasts with some previous research that indicates a more positive attitude towards pro-environmental behavior when the impact of actions is perceived as more temporally proximal (Kim and Ahn, 2019; Pavey & Churchill, 2017).

In the context of "anticipated warm glow", the research successfully identified and distinguished two key elements: "Social and Environmental Contribution" and "Personal Satisfaction". The exploration of these elements not only unveils the emotional complexities linked to pro-environmental actions but also enriches existing literature by presenting a comprehensive view of the factors underlying the warm glow phenomenon. The research demonstrates that warm glow encompasses both a social and environmental element, elucidating motivations behind actions benefiting society and nature, as well as a component tied to personal satisfaction and fulfillment derived from contributing positively to the well-being of others and the environment. This acknowledgment of personal satisfaction adds an impure dimension to pro-social behaviors, recognizing that individuals may experience intrinsic benefits from their actions. This finding aligns with the broader literature on the concept of impure altruism, where warm glow or personal satisfaction is considered alongside the altruistic intent of acting in favor of society (Andreoni, 1990). It acknowledges that, while the primary goal may be social contribution and well-being of others, there is also a personal dimension involved.

Moreover, the current research has revealed that the "Social and Environmental Contribution" component significantly predicts individuals' intention to purchase plant-based meat. This finding underscores the importance of motives related to "social and environmental contribution" in driving sustainable consumption. This is aligned with previous research that recognized social and environmental motives as significant drivers of sustainable behavior (Peloza & Shang, 2010). Individuals are more likely to choose plant-based meat when they perceive their choice as contributing to positive social and environmental impacts. Interestingly, this emphasis on "Social and Environmental Contribution" also had a notable negative influence on the choice of conventional meat, consistent with the literature on sustainable consumption. Individuals who prioritize social and environmental welfare are less inclined to choose conventional meat, given its higher environmental costs (Saget et al., 2021). Conversely, "Personal Satisfaction" was positively associated with purchase intention of conventional meat. This result suggests that personal motives, which tend to be more centered on self-enhancement rather than contributing to the broader community (Hansla et al., 2008), may be less effective in promoting sustainable behavior. These findings underscore the pivotal role of social and environmental motives in driving sustainable consumption, contrasting with the impact of personal motives.

The finding indicating a lower level of "Personal Satisfaction" among individuals with higher social-altruistic values, within the context of anticipated warm glow, aligns with established theories in sustainable behavior. This suggests that individuals with robust social-altruistic values tend to prioritize societal and environmental contributions over personal satisfaction. This pattern is consistent with existing research (De Groot & Steg, 2008), highlighting a tendency for individuals with strong social-altruistic values to engage in pro-social and environmentally friendly behaviors. This theoretical insight enhances our understanding of the dynamics between personal values and choices in sustainable consumption, elucidating why individuals with strong social-altruistic values may prioritize societal and environmental contributions.

The influence of personal values on purchase intention indicated that the combination of short-term framing and biospheric values increased the intention to purchase plant-based meat. This finding enhances our comprehension of how personal values interact with temporal messaging to shape sustainable consumption behaviors. From a theoretical perspective, this result suggests that individuals who have a strong concern for environmental issues (biospheric values) may

be particularly responsive to short-term messages. We suspect this because individuals with a pronounced environmental consciousness might feel a greater sense of urgency and immediate responsibility when presented with short-term messages. Previous research explained the efficacy of short-term messages on biospheric individuals due to their low-to-moderate level of considerations of future consequences (Xu et al., 2015). This is consistent with our results indicating the effectiveness of short-term messages on individuals holding biospheric value, shedding new light on the relationship between short-term framing, biospheric value and sustainable consumption. It also encourages scholars to explore the broader implications of these findings on the messages aimed at promoting sustainable choices.

Practical implications

The present findings have multiple managerial implications. Particularly, it provides valuable insights for food marketers and policymakers seeking to promote sustainable choices and reduce environmental impact in the food industry (Chander & Muthukrishnan, 2015). By understanding the role of temporal messages, strategies to encourage consumers to make eco-friendly choices can be developed. Marketers can use temporal messages in establishing urgency in consumers mind to positively influence their behavior. This study highlights the importance of temporal messages in shaping consumers' purchase intentions. The research indicates that consumers are more likely to consider buying plant-based meat when exposed to either short-term or long-term messages, rather than messages lacking a temporal context (no temporal message). Notably, no temporal messages were not effective in generating purchase intention for sustainable products. This is relevant from a practical perspective as it emphasizes the strategic significance of incorporating a temporal dimension into marketing campaigns to effectively encourage sustainable consumption practices.

Moreover, the study revealed that personal values play a crucial role in shaping consumer preferences. Notably, individuals who strongly prioritize social-altruistic values tend to be more receptive to messages that highlight the social and environmental consequences of their choices. This insight carries valuable segmentation implications for marketers. By leveraging consumer analytics and survey, companies can gain insights into consumers personal values and their lifestyle choice, such as willingness to contribute to social and environmental causes. Armed with this knowledge, they can target social-altruistic individuals customizing messages with the societal and ecological benefits of opting for plant-based meat. Tailoring campaigns

in this way proves to be a powerful approach for garnering the attention and endorsement of environmentally conscious consumers.

When it comes to emotions involved in consumers decision-making, understanding the difference between “Social and Environmental Contribution” and “Personal Satisfaction” has practical implications. Recognizing that consumers are motivated by a desire to contribute to society and the environment or seek personal satisfaction allows marketers to create emotionally resonant messages. Based on data gathered, companies can understand which customers they want to target and customized messages that leverage specific emotions. Messages emphasizing community and eco-consciousness can engage those motivated by societal and environmental contributions. For individuals seeking personal satisfaction, messages evoking happiness, and fulfillment are more effective. This approach enables marketers campaigns to connect with specific segments on an emotional level, fostering deeper connections and appealing to diverse motivations. Essentially, leveraging emotions in marketing and communication strategies is a potent way to engage consumers and create positive associations with food products.

Limitations and future research

While the study’s findings provided valuable insights into the effect of the temporal framing and warm glow on purchase intention of plant-based meat, it is important to acknowledge several limitations. One notable limitation pertains to the use of hypothetical scenarios rather than real-world settings. Participants in the study may have responded differently to the temporal messages within a hypothetical scenario compared to how they might react in authentic, real-life situations. Real-life contexts involve a multitude of uncontrolled variables, such as social, cultural, economic, and situational influences, which may not be fully replicated in hypothetical scenarios. Consequently, the generalizability of our findings to actual consumer behaviors in complex, real-world settings might be limited. Therefore, future research may address these limitations by conducting studies in real-world setting, such grocery stores. This helps overcome the limitation of relying on self-reported intentions by assessing actual choices, offering more tangible insights into the impact of temporal messages and personal values.

Future research can investigate the effectiveness of temporal messages and personal values on the purchase intention of plant-based meat in diverse context or among various populations. Since the meat consumption is highly related to cultural factors, cross-cultural research can examine how the relationship between personal values and meat alternative choices varies across different cultural contexts. By framing plant-based meat as a substitute for conventional meat, future research can offer valuable insights into how cultural differences impact the acceptance of plant-based alternatives. Understanding distinct attitudes, preferences, and values associated with food choices in different cultures becomes essential for comprehending the dynamics of plant-based meat acceptance and further increase the consumption of this food.

The current study has provided valuable insights into the effects of temporal messages on consumers' intentions to purchase plant-based meat. To advance understanding of consumer behavior and decision-making in the realm of sustainable food choices, future research may explore the influence of other types of messages and interventions. Although, temporal messages were shown to be effective in affecting purchase intention of plant-based meat, they did not emphasize what other people do or think about plant-based meat. For instance, future research can investigate how social norms (descriptive and injunctive) and temporal messages interact to shape consumer behavior (Cialdini et al., 1991). They might examine whether temporal messages are more effective when they align with prevailing social norms. Additionally, exploring how personal values, such as egoistic, social-altruistic, and biospheric values, interact with social norms is another promising avenue for exploration. Researchers could investigate whether individuals with specific values are more inclined to purchase plant-based or other sustainable food products when they perceive that their peers are making similar choices. Another possible future research lies in exploring the impact of temporal messages that emphasize the health benefits of consuming plant-based meat, as opposed to environmental aspects. This research can provide valuable insights into whether consumers are more influenced by messages related to health or those focusing on environmental factors in their food choices.

Conclusion

In conclusion, this study delved into the domain of consumer behavior to understand how to increase the consumption of plant-based meat, providing insights into the impact of temporal framing and personal values. Addressing the challenge of low plant-based meat consumption,

considered crucial for reducing the environmental impact of the agri-food sector, our findings suggest that both short-term and long-term temporal messages hold promise in increasing consumers' intention to choose plant-based meat. The study uncovered that consumers who view their choices as contributing to society and the environment are more inclined to embrace sustainable food options, aligning with our ultimate objective of increasing plant-based meat consumption. And finally, individuals with biospheric values, when exposed to short-term messages, showed a higher intention to purchase plant-based meat. Understanding these consumer dynamics empowers policymakers and marketers to design effective strategies for promoting sustainable eating habits and environmental conservation. This study emphasizes the necessity for collaborative efforts among policymakers, marketers, and consumers to establish a more sustainable and ethical food system.

References:

Abbott, A. J., Nandeibam, S., & O'Shea, L. (2013). Recycling: Social norms and warm-glow revisited. *Ecological Economics*, *90*, 10–18. https://doi.org/10.1016/j.ecolecon.2013.02.015

Aleksandrowicz, Lukasz, et al. "The Impacts of Dietary Change on Greenhouse Gas Emissions, Land Use, Water Use, and Health: A Systematic Review." PLOS ONE, vol. 11, no. 11, Public Library of Science, Nov. 2016, p. e0165797. https://doi.org/10.1371/journal.pone.0165797.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal*, *100*(401), 464. https://doi.org/10.2307/2234133

Bennett, R. (2003). Estimating the benefits of farm animal welfare legislation using the contingent valuation method. *Agricultural Economics*, *29*(1), 85–98. https://doi.org/10.1016/s0169-5150(03)00037-9

Bhattacharya, A., Good, V., Sardashti, H., & Peloza, J. (2020). Beyond warm glow: The Risk-Mitigating Effect of Corporate Social Responsibility (CSR). *Journal of Business Ethics*, *171*(2), 317–336. https://doi.org/10.1007/s10551-020-04445-0

Boobalan, K., Nawaz, N., Harindranath, R. M., & Gajenderan, V. (2021b). Influence of altruistic motives on organic food purchase: Theory of Planned Behavior. *Sustainability*, *13*(11), 6023. https://doi.org/10.3390/su13116023

Chander, P., & Muthukrishnan, S. (2015). Green consumerism and pollution control. *Journal of Economic Behavior and Organization*, *114*, 27–35. https://doi.org/10.1016/j.jebo.2015.02.013

Chai, B. C., Van Der Voort, J. R., Grofelnik, K., Eliasdottir, H. G., Klöss, I., & Perez-Cueto, F. J. (2019). Which diet has the least environmental impact on our planet? A systematic review of vegan, vegetarian and omnivorous diets. *Sustainability*, *11*(15), 4110. https://doi.org/10.3390/su11154110

Cheng, T., Woon, D. K., & Lynes, J. (2011). The use of message framing in the promotion of environmentally sustainable behaviors. *Social Marketing Quarterly*, *17*(2), 48–62. https://doi.org/10.1080/15245004.2011.570859

Clark, Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A Focus Theory of Normative Conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In *Advances in Experimental Social Psychology* (pp. 201–234). https://doi.org/10.1016/s0065-2601(08)60330-5

C. F., Kotchen, M. J., & Moore, M. R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, *23*(3), 237–246. https://doi.org/10.1016/s0272-4944(02)00105-6

Crumpler, H., & Grossman, P. J. (2008). An experimental test of warm glow giving. *Journal of Public Economics*, *92*(5–6), 1011–1021. https://doi.org/10.1016/j.jpubeco.2007.12.014

Culliford, A., & Bradbury, J. (2020). A cross-sectional survey of the readiness of consumers to adopt an environmentally sustainable diet. *Nutrition Journal*, *19*(1). https://doi.org/10.1186/s12937-020-00644-7

De Boer, J., & Aiking, H. (2022). Do EU consumers think about meat reduction when considering to eat a healthy, sustainable diet and to have a role in food system change? *Appetite*, *170*, 105880. https://doi.org/10.1016/j.appet.2021.105880

De Groot, J. I. M., & Steg, L. (2007). Value orientations to explain beliefs related to environmental significant behavior. *Environment and Behavior*, *40*(3), 330–354. https://doi.org/10.1177/0013916506297831

Dreyer, J. K., Sharma, V., & Smith, W. T. (2023). Warm-glow investment and the underperformance of green stocks. *International Review of Economics & Finance*, *83*, 546–570. https://doi.org/10.1016/j.iref.2022.10.006

FAO, IFAD, UNICEF, WFP and WHO. 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome, FAO. Licence: CC BY-NC-SA 3.0 IGO.

Feeding the Future: Plant-Based Meat for global food security and environmental sustainability. (2020). *Cereal Foods World*, *65*(4). https://doi.org/10.1094/cfw-65-4-0042

Filippin, D., Sarni, A. R., Rizzo, G., & Baroni, L. (2023). Environmental Impact of Two Plant-Based, Isocaloric and Isoproteic Diets: The Vegan Diet vs. the Mediterranean Diet. *International Journal of Environmental Research and Public Health*, *20*(5), 3797. https://doi.org/10.3390/ijerph20053797

Florence, E. S., Fleischman, D., Mulcahy, R., & Wynder, M. (2022). Message framing effects on sustainable consumer behaviour: a systematic review and future research directions for social marketing. *Journal of Social Marketing*, *12*(4), 623–652. https://doi.org/10.1108/jsocm-09-2021-0221

Gaydhane, M. K., Mahanta, U., Sharma, C. S., Khandelwal, M., & Ramakrishna, S. (2018). Cultured meat: state of the art and future. *Biomanufacturing Reviews*, *3*(1). https://doi.org/10.1007/s40898-018-0005-1

Hansla, A., Gamble, A., Juliusson, Á., & Gärling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology*, *28*(1), 1–9. https://doi.org/10.1016/j.jenvp.2007.08.004

Hartmann, P., & Apaolaza-Ibáñez, V. (2012). Consumer attitude and purchase intention toward green energy brands: The roles of psychological benefits and environmental concern. *Journal of Business Research*, *65*(9), 1254–1263. https://doi.org/10.1016/j.jbusres.2011.11.001

Hartmann, P., Eisend, M., Apaolaza, V., & D'Souza, C. (2017). Warm glow vs. altruistic values: How important is intrinsic emotional reward in proenvironmental behavior? *Journal of Environmental Psychology*, *52*, 43–55. https://doi.org/10.1016/j.jenvp.2017.05.006

Heller, M. C., and Keoleian, G. A. Beyond Meat's Beyond Burger life cycle assessment: A detailed comparison between a plant-based and an animal-based protein source. Published online at http://css. umich.edu/publication/beyond-meats-beyond-burger-life-cycleassessment-detailed-comparison-between-plant-based. 2018.

Herberz, M., Brosch, T., & Hahnel, U. J. (2023). The impact of perceived partisanship on climate policy support: A conceptual replication and extension of the temporal framing effect. *Journal of Environmental Psychology*, *86*, 101972. https://doi.org/10.1016/j.jenvp.2023.101972

Hoek, A. C., Malekpour, S., Raven, R., Court, E., & Byrne, E. L. (2021). Towards environmentally sustainable food systems: decision-making factors in sustainable food production and consumption. *Sustainable Production and Consumption*, *26*, 610–626. https://doi.org/10.1016/j.spc.2020.12.009

Horváth, C., & Van Birgelen, M. (2015). The role of brands in the behavior and purchase decisions of compulsive versus noncompulsive buyers. *European Journal of Marketing*, *49*(1/2), 2–21. https://doi.org/10.1108/ejm-10-2012-0627

Hu, S. (2014). Pretesting. In *Springer eBooks* (pp. 5048–5052). https://doi.org/10.1007/978-94-007-0753-5_2256

Ingenbleek, P. T., Meulenberg, M. T., & Van Trijp, J. (2015). Buyer social responsibility: a general concept and its implications for marketing management. *Journal of Marketing Management*, *31*(13–14), 1428–1448. https://doi.org/10.1080/0267257x.2015.1058848

Iweala, S., Spiller, A., & Meyerding, S. G. (2019). Buy good, feel good? The influence of the warm glow of giving on the evaluation of food items with ethical claims in the U.K. and Germany. *Journal of Cleaner Production*, *215*, 315–328. https://doi.org/10.1016/j.jclepro.2018.12.266

Jang, H., & Cho, M. (2022). Relationship between Personal Values and Intentions to Purchase Plant-Based Meat Alternatives: Application of the Dual Concern Theory. *International Journal of Environmental Research and Public Health*, *19*(14), 8673. https://doi.org/10.3390/ijerph19148673

Jones, C., Hine, D. W., & Marks, A. D. G. (2016b). The Future is Now: Reducing Psychological Distance to Increase Public Engagement with Climate Change. *Risk Analysis*, *37*(2), 331–341. https://doi.org/10.1111/risa.12601

Khan, S., Dettling, J., Loyola, C., Hester, J., and Moses, R. Comparative environmental LCA of the Impossible Burger with conventional ground beef burger. Published online at https://impossible foods.com/mission/lca-update-2019. 2019.

Kim, K., & Ahn, S. S. (2019). The moderating role of cultural background in temporal framing: focusing on climate change awareness advertising. *Asian Journal of Communication*, *29*(4), 363–385. https://doi.org/10.1080/01292986.2019.1624793

Kim, K., Zhang, R., & Li, X. (2008). Effects of Temporal and Social Distance on Consumer Evaluations: Table 1. *Journal of Consumer Research*, *35*(4), 706–713. https://doi.org/10.1086/592131

Ladhari, R., & Tchetgna, N. M. (2017). Values, socially conscious behaviour and consumption emotions as predictors of Canadians' intent to buy fair trade products. *International Journal of Consumer Studies*, *41*(6), 696–705. https://doi.org/10.1111/ijcs.12382

Liberman, N., Trope, Y., & Wakslak, C. J. (2007). Construal Level Theory and Consumer Behavior. *Journal of Consumer Psychology*, *17*(2), 113–117. https://doi.org/10.1016/s1057-7408(07)70017-7

Lim, Stephen S., et al. "A Comparative Risk Assessment of Burden of Disease and Injury Attributable to 67 Risk Factors and Risk Factor Clusters in 21 Regions, 1990–2010: A Systematic Analysis for the Global Burden of Disease Study 2010." *The Lancet*, vol. 380, no. 9859, Elsevier BV, Dec. 2012, pp. 2224–60. https://doi.org/10.1016/s0140-6736(12)61766-8.

Lynch, J., & Zauberman, G. (2006b). When do you Want It? Time, Decisions, and Public Policy. *Journal of Public Policy & Marketing*, *25*(1), 67–78. https://doi.org/10.1509/jppm.25.1.67

McElroy, T., & Mascari, D. (2007). When Is It Going To Happen? How Temporal Distance Influences Processing for Risky–Choice Framing Tasks. *Social Cognition*, *25*(4), 495–517. https://doi.org/10.1521/soco.2007.25.4.495

Mellers, B. A., & McGraw, A. P. (2001). Anticipated Emotions as Guides to Choice. *Current Directions in Psychological Science*, *10*(6), 210–214. https://doi.org/10.1111/1467-8721.00151

Moorman, M., & Van Den Putte, B. (2008). The influence of message framing, intention to quit smoking, and nicotine dependence on the persuasiveness of smoking cessation messages. *Addictive Behaviors*, *33*(10), 1267–1275. https://doi.org/10.1016/j.addbeh.2008.05.010

Nabi, R. L. (2003). Exploring the Framing Effects of Emotion. *Communication Research*, *30*(2), 224–247. https://doi.org/10.1177/0093650202250881

Nelson, K. M., Bauer, M. K., & Partelow, S. (2021). Informational nudges to encourage pro-environmental behavior: examining differences in message framing and human interaction. *Frontiers in Communication*, *5*. https://doi.org/10.3389/fcomm.2020.610186

Nunes, P. A., & Schokkaert, E. (2003). Identifying the warm glow effect in contingent valuation. *Journal of Environmental Economics and Management*, *45*(2), 231–245. https://doi.org/10.1016/s0095-0696(02)00051-7

O'Brien, E., & Kassirer, S. (2018). People are slow to adapt to the warm glow of giving. *Psychological Science*, *30*(2), 193–204. https://doi.org/10.1177/0956797618814145

O'Keefe, D. J., & Jensen, J. D. (2007). The Relative Persuasiveness of Gain-Framed Loss-Framed Messages for Encouraging Disease Prevention Behaviors: A Meta-Analytic Review. *Journal of Health Communication*, *12*(7), 623–644. https://doi.org/10.1080/10810730701615198

Onwezen, Marleen C., et al. "A Systematic Review on Consumer Acceptance of Alternative Proteins: Pulses, Algae, Insects, Plant-based Meat Alternatives, and Cultured Meat." *Appetite*, vol. 159, Elsevier BV, Apr. 2021, p. 105058. https://doi.org/10.1016/j.appet.2020.105058.

Pavey, L., & Churchill, S. (2017). Impulsivity and temporal frame: Reducing frequency of snacking by highlighting immediate health benefits. *Eating Behaviors*, *26*, 1–5. https://doi.org/10.1016/j.eatbeh.2017.01.004

Peloza, J., & Shang, J. (2010). How can corporate social responsibility activities create value for stakeholders? A systematic review. *Journal of the Academy of Marketing Science*, *39*(1), 117–135. https://doi.org/10.1007/s11747-010-0213-6

Plous, S. (1993). *The psychology of judgment and decision making*. Mcgraw-Hill Book Company.

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Pounders, K., Lee, S., & Mackert, M. (2015). Matching Temporal Frame, Self-View, and Message Frame valence: Improving persuasiveness in health communications. *Journal of Advertising*, *44*(4), 388–402. https://doi.org/10.1080/00913367.2015.1071210

Rosi, A., Mena, P., Pellegrini, N., Turroni, S., Neviani, E., Ferrocino, I., Di Cagno, R., Ruini, L., Ciati, R., Angelino, D., Maddock, J., Gobbetti, M., Brighenti, F., Del Rio, D., & Scazzina, F. (2017). Environmental impact of omnivorous, ovo-lacto-vegetarian, and vegan diet. *Scientific Reports*, *7*(1). https://doi.org/10.1038/s41598-017-06466-8

Saget, S., Costa, M. P., Santos, C. S., Vasconcelos, M. W., Styles, D., & Williams, M. (2021). Comparative life cycle assessment of plant and beef-based patties, including carbon opportunity costs. *Sustainable Production and Consumption*, *28*, 936–952. https://doi.org/10.1016/j.spc.2021.07.017

Sapiains, R., Beeton, R. J. S., & Walker, I. (2016). Individual responses to climate change: Framing effects on pro-environmental behaviors. *Journal of Applied Social Psychology*, *46*(8), 483–493. https://doi.org/10.1111/jasp.12378

Scheufele, D. A. (1999). Framing as a Theory of Media Effects. *Journal of Communication*, *49*(1), 103–122. https://doi.org/10.1111/j.1460-2466.1999.tb02784.x

Scheufele, D. A., & Tewksbury, D. (2007). Framing, Agenda Setting, and Priming: The Evolution of Three Media Effects Models. *Journal of Communication*, *57*(1), 9–20. https://doi.org/10.1111/j.0021-9916.2007.00326.x

Schneider, C. R., Zaval, L., Weber, E. U., & Markowitz, E. M. (2017). The influence of anticipated pride and guilt on pro-environmental decision making. *PLOS ONE*, *12*(11), e0188781. https://doi.org/10.1371/journal.pone.0188781

Schwartz, S. H. (1977). Normative influences on altruism. In *Advances in Experimental Social Psychology* (pp. 221–279). https://doi.org/10.1016/s0065-2601(08)60358-5

Spence, A., Poortinga, W., & Pidgeon, N. F. (2011). The psychological distance of climate change. *Risk Analysis*, *32*(6), 957–972. https://doi.org/10.1111/j.1539-6924.2011.01695.x

Stanley, S. K., Klas, A., Clarke, E. J. R., & Walker, I. (2021). The effects of a temporal framing manipulation on environmentalism: A replication and extension. *PLOS ONE*, *16*(2), e0246058. https://doi.org/10.1371/journal.pone.0246058

Stern, P. C. (2000). New Environmental Theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407–424. https://doi.org/10.1111/0022-4537.00175

Stern, P. C., & Dietz, T. (1994). The Value Basis of Environmental Concern. *Journal of Social Issues*, *50*(3), 65–84. https://doi.org/10.1111/j.1540-4560.1994.tb02420.x

Taufik, D., Bolderdijk, J. W., & Steg, L. (2014). Acting green elicits a literal warm glow. *Nature Climate Change*, *5*(1), 37–40. https://doi.org/10.1038/nclimate2449

Taufik, "Prospective 'Warm-glow' of Reducing Meat Consumption in China: Emotional Associations With Intentions for Meat Consumption Curtailment and Consumption of Meat Substitutes." *Journal of Environmental Psychology*, vol. 60, Elsevier BV, Dec. 2018, pp. 48–54. https://doi.org/10.1016/j.jenvp.2018.10.004.

Tosun, P., Yanar, M., Sezgin, S., & Uray, N. (2020). Meat Substitutes in Sustainability Context: A Content Analysis of Consumer Attitudes. *Journal of International Food & Agribusiness Marketing*, *33*(5), 541–563. https://doi.org/10.1080/08974438.2020.1840475

Van Der Linden, S. (2015). Intrinsic motivation and pro-environmental behaviour. *Nature Climate Change*, *5*(7), 612–613. https://doi.org/10.1038/nclimate2669

Van Der Linden, S. (2018). Warm glow is associated with low- but not high-cost sustainable behaviour. *Nature Sustainability*, *1*(1), 28–30. https://doi.org/10.1038/s41893-017-0001-0

Vinson, D. E., Scott, J. E., & Lamont, L. M. (1977). The role of personal values in marketing and consumer behavior. *Journal of Marketing*, *41*(2), 44–50. https://doi.org/10.1177/002224297704100215

Vinzenz, F., Priskin, J., Wirth, W., Ponnapureddy, S., & Ohnmacht, T. (2019). Marketing sustainable tourism: the role of value orientation, well-being and credibility. *Journal of Sustainable Tourism*, *27*(11), 1663–1685. https://doi.org/10.1080/09669582.2019.1650750

Wang, J., Yang, X., He, Z., Wang, J., Jiang, B., & Gao, J. (2022). The impact of positive emotional appeals on the green purchase behavior. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.716027

Xu, X., Arpan, L. M., & Chen, C. (2015b). The moderating role of individual differences in responses to benefit and temporal framing of messages promoting residential energy saving. *Journal of Environmental Psychology*, *44*, 95–108. https://doi.org/10.1016/j.jenvp.2015.09.004

Yong-Ki, L., Kim, S., Kim, M., & Choi, J. (2014). Antecedents and interrelationships of three types of pro-environmental behavior. *Journal of Business Research*, *67*(10), 2097–2105. https://doi.org/10.1016/j.jbusres.2014.04.018

Zhang, X., Jeong, E., Olson, E. D., & Evans, G. (2020). Investigating the effect of message framing on event attendees' engagement with advertisement promoting food waste reduction practices. *International Journal of Hospitality Management*, *89*, 102589. https://doi.org/10.1016/j.ijhm.2020.102589

Zhao, M., & Xie, J. (2011). Effects of social and temporal distance on consumers' responses to peer recommendations. *Journal of Marketing Research*, *48*(3), 486–496. https://doi.org/10.1509/jmkr.48.3.486

Appendices

Appendix 1: Qualtrics Pre-test Experiment

Inizio blocco: Intro

Q1.1 **Welcome to our exciting research!**

Your valuable input can make a significant contribution to my thesis, are you ready to help me?
Do you know that what we eat can have a big impact on the people and the environment around us? If you already know, that's great news. If this is something new for you, you will be curious to find out more.

Specifically, my thesis will try to increase the purchase intention of plant-based meat, using different messages strategy and positive emotions. In this short questionnaire, you will have to picture yourself in your favorite supermarket doing grocery for meat products. Your decisions matter, and we are eager to understand what influences you.

However, let me introduce myself. I am a master student in Sustainable Business and Innovation at Wageningen University. And I am writing a thesis in Marketing and Consumer Behaviour.

To answer this questionnaire, I will need 4 minutes of your day. Can you do it?

We guarantee your anonymity, and we will use your responses only for research purposes. As a participant in this research, you have the right to stop participating whenever you want. You have to confirm to be 16 or older.

In case you would like to learn more about this study, you can contact me at: samuele.fra@wur.nl

---

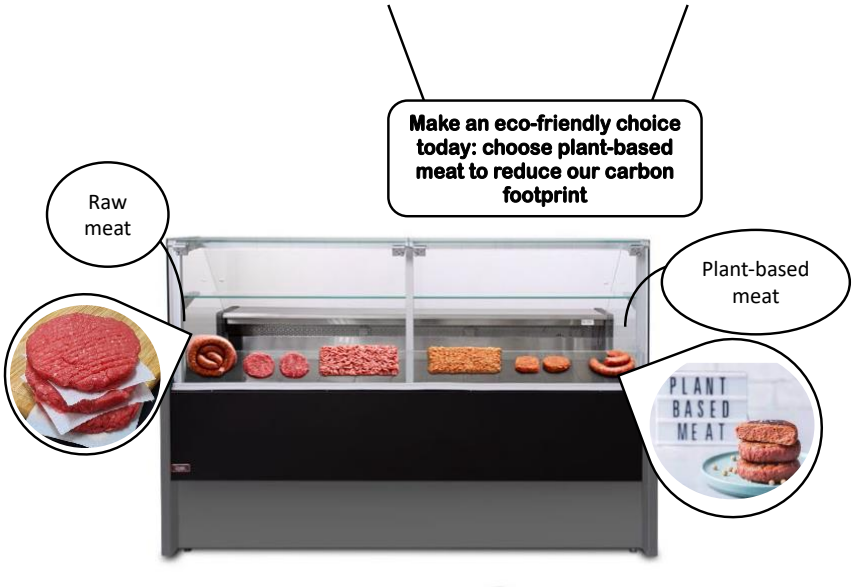
Q1.2 If you agree with everything mentioned above, click on CONTINUE

○ CONTINUE (1)

Fine blocco: Intro

Inizio blocco: Short-term 1

Q2 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:



Q3 In your view, what time does the message focus upon?

	1. Now (2)	2. (3)	3. (4)	4. (5)	5. (6)	6. (7)	7. In the far future (8)	8. There is no time indication (10)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Short-term 1

Inizio blocco: Long-term 1

Q4 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:

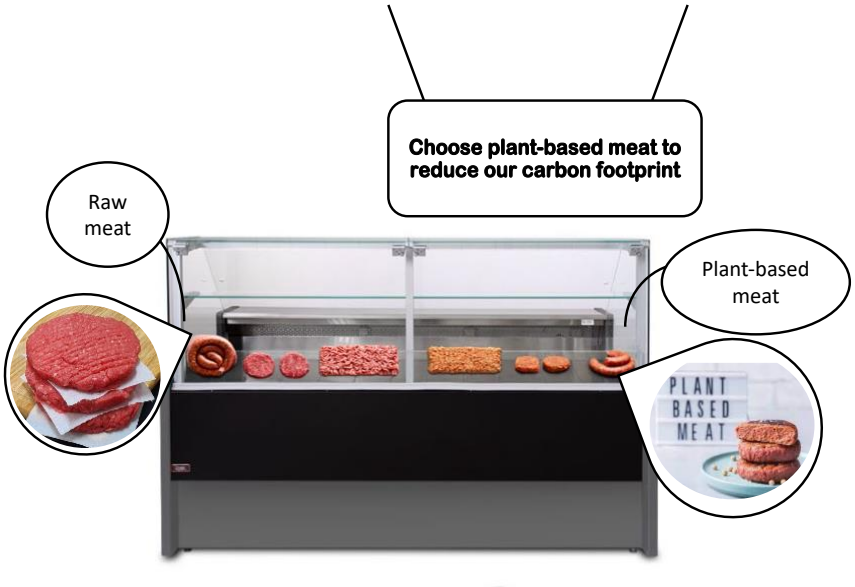
Q5 In your view, what time does the message focus upon?

	1. Now (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Long-term 1

Inizio blocco: Control 1

Q6 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:



Q7 In your view, what time does the message focus upon?

	1. Now (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. In the far future (7)	8. There is no time indication (9)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Control 1

Inizio blocco: Short-term 2

Q8 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:

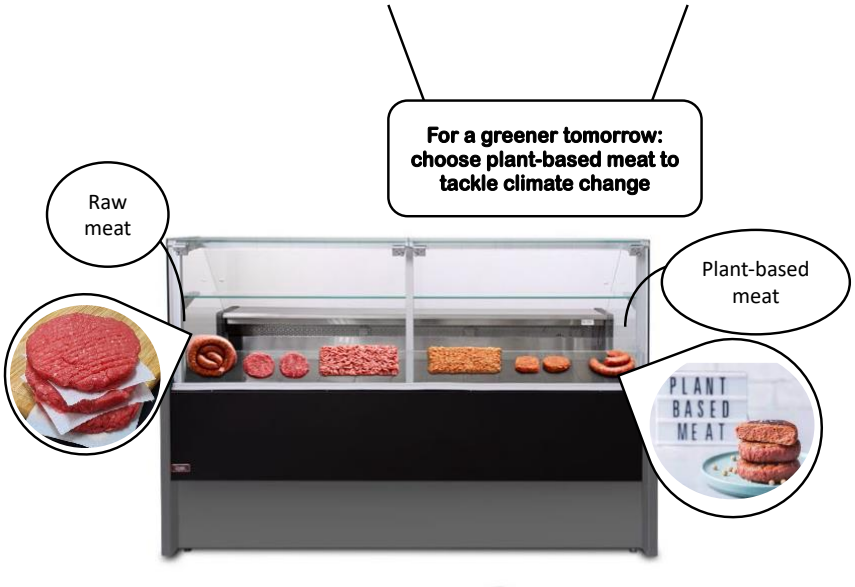
Q9 In your view, what time does the message focus upon?

	1. Now (2)	2. (3)	3. (4)	4. (5)	5. (6)	6. (7)	7. In the far future (8)	8. There is no time indication (10)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Short-term 2

Inizio blocco: Long-term 2

Q10 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:



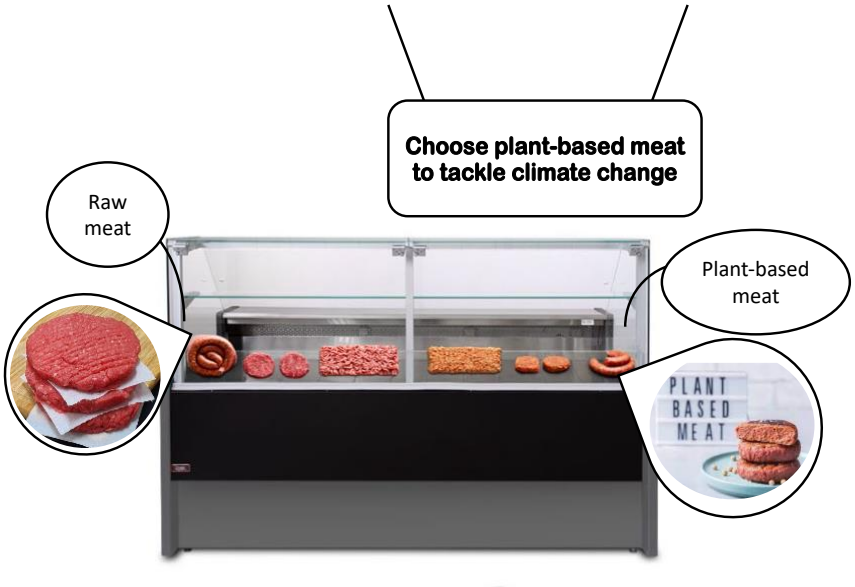
Q11 In your view, what time does the message focus upon?

	1. Now (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Long-term 2

Inizio blocco: Control 2

Q12 Imagine you are in a supermarket, and you want to buy meat. As you arrive in front of the counter, this is what you observe:



Q13 In your view, what time does the message focus upon?

	1. Now (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Fine blocco: Control 2

Inizio blocco: Display

Q14 To what degree do you think the display ...?

	1. Not at all (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. Very much (7)
Is clear (1)	○	○	○	○	○	○	○
Is understandable (3)	○	○	○	○	○	○	○
Is appealing (4)	○	○	○	○	○	○	○
Is realistic (9)	○	○	○	○	○	○	○
Describes a supermarket setting (5)	○	○	○	○	○	○	○
Shows different products (6)	○	○	○	○	○	○	○

Fine blocco: Display

Inizio blocco: Demographics

Q15 What is your age (in years)? I am ... years old.

_____

Q16 What is your gender?

- Male (1)
- Female (2)
- Prefer not to say (4)

Q17 What is your nationality?

_____

Q18 We thank you very much for your participation in this study!

If you would like to make any comments about this study, or provide other suggestions, please enter them below.

_____

Q19 For additional questions or comments, you can contact me Samuele Frà via the following email address: samuele.fra@wur.nl

Fine blocco: Demographics

Appendix 2: Qualtrics Main Experiment

Inizio blocco: Language

Q1 In what language would you like to answer the questionnaire?

- ○ Italian (1)
- ○ English (2)

Fine blocco: Language

Inizio blocco: Introduction (EN)

Q2 **Welcome to our exciting research!**

Your valuable input can make a significant contribution to my thesis. Are you ready to help me?
Do you know that what we eat can have a big impact on people and the environment around us? If you already know, that's great news. If this is something new for you, you will be curious to find out more.

Specifically, my thesis will investigate how people make food choices in supermarkets. In this short questionnaire, you will have to picture yourself in your favorite supermarket doing groceries for meat products. Your decisions matter, and we are eager to understand what influences you.

However, let me introduce myself. I am a master student in Sustainable Business and Innovation at Wageningen University and I am writing a thesis in Marketing and Consumer Behaviour.

To answer this questionnaire, I will need 8 minutes of your day. Can you do it?

We guarantee your anonymity, and we will use your responses only for research purposes. As a participant in this research, you have the right to stop participating whenever you want. You have to confirm to be 16 or older.

In case you would like to learn more about this study, you can contact me at: samuele.fra@wur.nl

---

Q2.1 If you agree with everything mentioned above, click on CONTINUE.
If you don't agree, you will be redirected to the end of the survey.

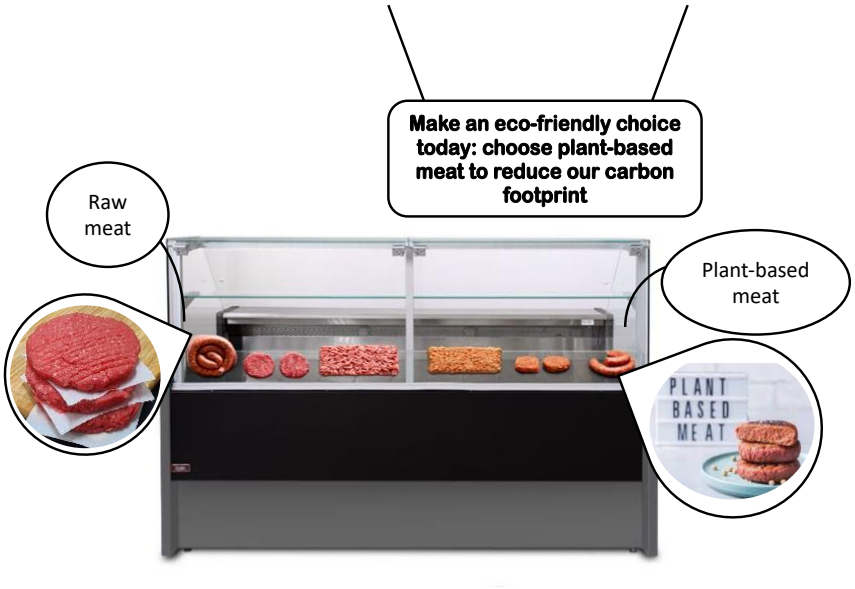
- ○ CONTINUE (1)
- ○ END OF SURVEY (5)

Fine blocco: Introduction (EN)

Inizio blocco: Short-term (EN)

Q3 Imagine yourself doing your weekly groceries at the local supermarket. As part of your shopping list, you intend to purchase meat products. You walk through the shelves of the meat department to explore the supermarket's offerings.

At this point, you come across the meat counter and this is what you observe:



Q3.1 In the described scenario, which meat product would you be most likely to buy? Click on the answer that best suits your preference.

- ○ Meat on the left (1)
- ○ Meat on the right (2)

Q3.2 To what degree would you buy the ...?

The answer possibilities range from 1 ("I would not definitely buy this...") to 7 (" I would definitely buy this..."). Please click on the answer that fits you the best.

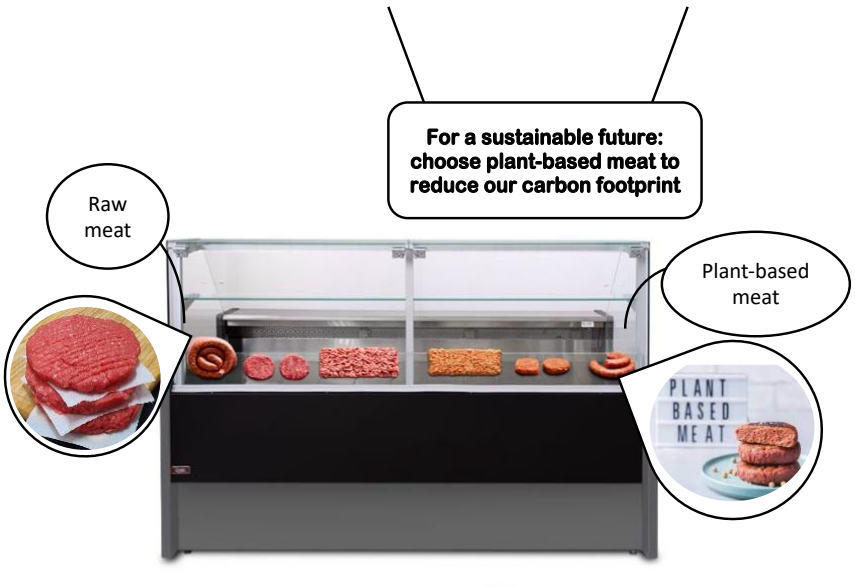
	1. I would definitely not buy this... (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. I would definitely buy this... (7)
Meat on the left (1)	○	○	○	○	○	○	○
Meat on the right (2)	○	○	○	○	○	○	○

Fine blocco: Short-term (EN)

Inizio blocco: Long-term (EN)

Q4 Imagine yourself doing your weekly groceries at the local supermarket. As part of your shopping list, you intend to purchase meat products. You walk through the shelves of the meat department to explore the supermarket's offerings.

At this point, you come across the meat counter and this is what you observe:



Q4.1 In the described scenario, which meat product would you be most likely to buy? Click on the answer that best suits your preference.

- ○ Meat on the left (1)
- ○ Meat on the right (2)

Q4.2 To what degree would you buy the ...?

The answer possibilities range from 1 ("I would not definitely buy this...") to 7 (" I would definitely buy this..."). Please click on the answer that fits you the best.

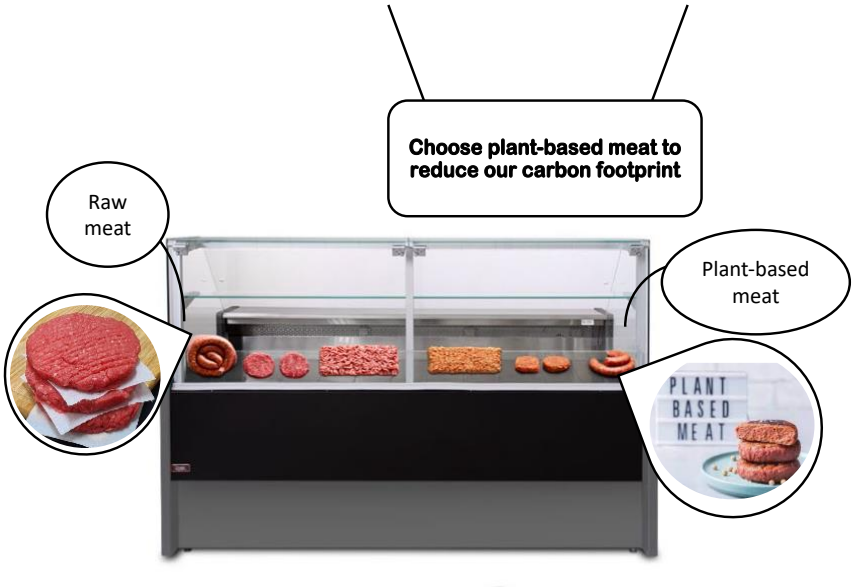
	1. I would definitely not buy this... (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. I would definitely buy this... (7)
Meat on the left (1)	○	○	○	○	○	○	○
Meat on the right (2)	○	○	○	○	○	○	○

Fine blocco: Long-term (EN)

Inizio blocco: Control (EN)

Q5 Imagine yourself doing your weekly groceries at the local supermarket. As part of your shopping list, you intend to purchase meat products. You walk through the shelves of the meat department to explore the supermarket's offerings.

At this point, you come across the meat counter and this is what you observe:



Q5.1 In the described scenario, which meat product would you be most likely to buy? Click on the answer that best suits your preference.

- ○ Meat on the left (1)
- ○ Meat on the right (2)

Q5.2 To what degree would you buy the ...?

The answer possibilities range from 1 ("I would not definitely buy this...") to 7 (" I would definitely buy this..."). Please click on the answer that fits you the best.

	1. I would definitely not buy this... (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. I would definitely buy this... (7)
Meat on the left (1)	○	○	○	○	○	○	○
Meat on the right (2)	○	○	○	○	○	○	○

Fine blocco: Control (EN)

Inizio blocco: Anticipated warm glow (EN)

Q6 How do you imagine you will feel after having chosen the meat of your liking?

Responses possibilities range from 1 (“Strongly disagree”) to 7 (“Strongly agree”). Please select the answer that best represents your opinion.

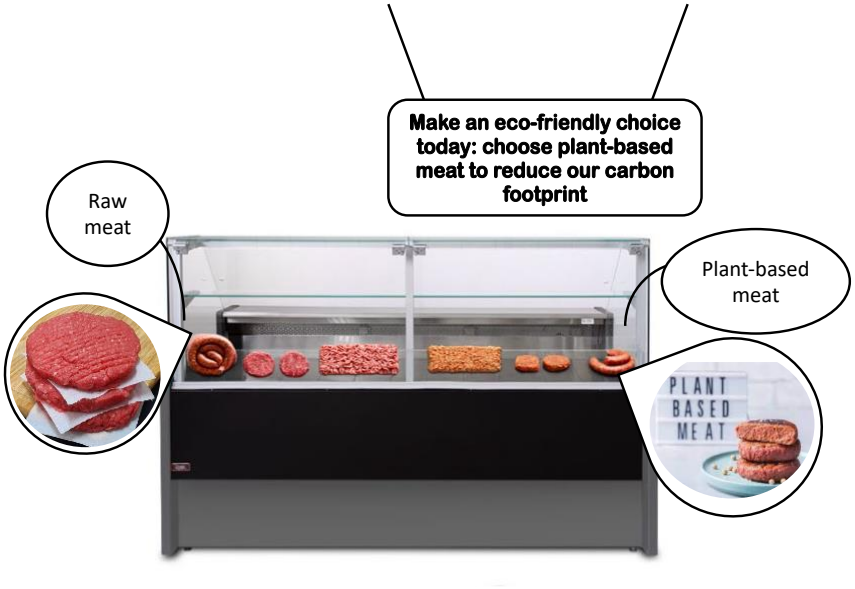
	1. Strongly disagree (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. Strongly agree (7)
1. I will feel good about myself (1)	○	○	○	○	○	○	○
2. I will feel personally satisfied (2)	○	○	○	○	○	○	○
3. I will feel as if I have contributed my part to society (3)	○	○	○	○	○	○	○
4. I will feel as if I have bought a healthy product (10)	○	○	○	○	○	○	○
5. I will feel as if I have contributed my part to the well-being of others (4)	○	○	○	○	○	○	○
6. I will feel as if I have contributed my part for the good of next generations (5)	○	○	○	○	○	○	○
7. I will feel as if I have bought something tasty (9)	○	○	○	○	○	○	○

8. I will feel as if I have contributed my part to reduce carbon emission (6)	○	○	○	○	○	○	○
9. I will feel as if I have contributed my part to preserve natural resources (7)	○	○	○	○	○	○	○
10. I will feel as if I have made a good bargain (11)	○	○	○	○	○	○	○

Fine blocco: Anticipated warm glow (EN)

Inizio blocco: Short-term check (EN)

Q7 Based on the picture that you have previously seen:



Q7.1 In your view, what time does the message focus upon?

Please select the time frame that, in your opinion, best describes the above message. The time frame varies from 1 ("now") to 7 ("in the far future"). While 8 indicates that there is no time indication.

	1. Now (1)	2. Very soon (2)	3. Soon (3)	4. In the near future (4)	5. In the future (5)	6. In the distant future (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Q7.2 To what degree do you think the display ...?

Responses range from 1 ("Not at all") to 7 ("Very much"). Please select the option that fits

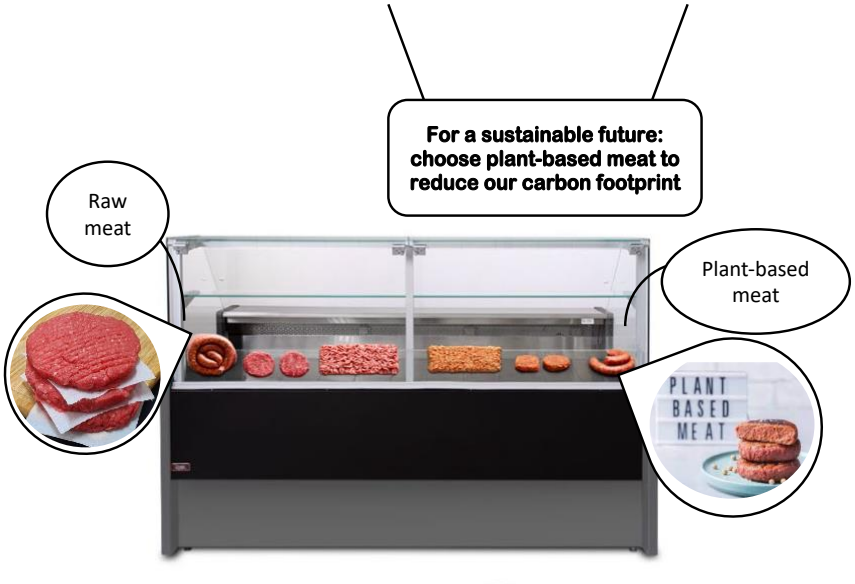
the best with your opinion.

	1. Not at all (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. Very much (7)
Is clear (1)	○	○	○	○	○	○	○
Is understandable (2)	○	○	○	○	○	○	○
Is appealing (3)	○	○	○	○	○	○	○
Is realistic (4)	○	○	○	○	○	○	○
Describes a supermarket setting (5)	○	○	○	○	○	○	○
Shows different product (6)	○	○	○	○	○	○	○

Fine blocco: Short-term check (EN)

Inizio blocco: Long-term check (EN)

Q8 Based on the picture that you have previously seen:



Q8.1 In your view, what time does the message focus upon?

Please select the time frame that, in your opinion, best describes the above message. The time frame varies from 1 ("now") to 7 ("in the far future"). While 8 indicates that there is no time indication.

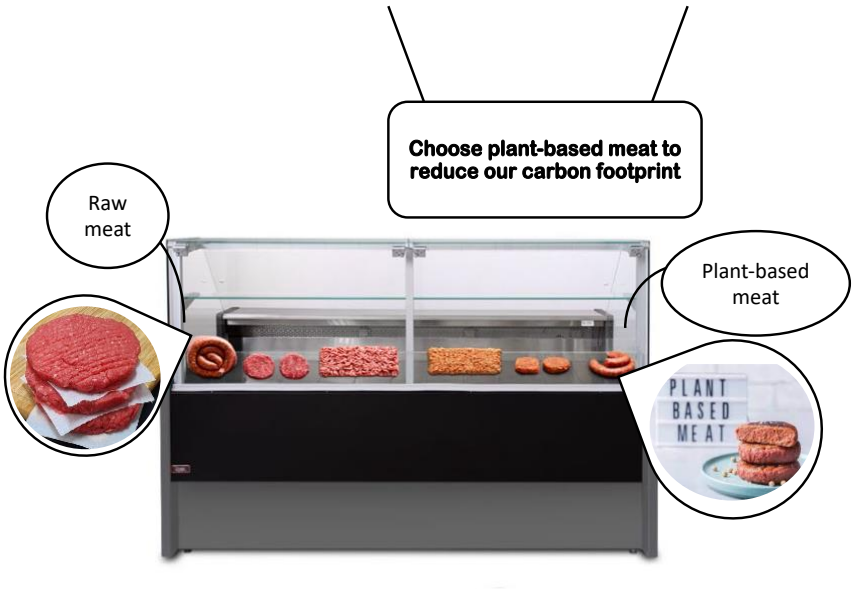
	1. Now (1)	2. Very soon (2)	3. Soon (3)	4. In the near future (4)	5. In the future (5)	6. In the distant future (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Q8.2 To what degree do you think the display ...?

Responses range from 1 ("Not at all") to 7 ("Very much"). Please select the option that fits the best with your opinion.

	1. Not at all (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. Very much (7)
Is clear (1)	○	○	○	○	○	○	○
Is understandable (2)	○	○	○	○	○	○	○
Is appealing (3)	○	○	○	○	○	○	○
Is realistic (4)	○	○	○	○	○	○	○
Describes a supermarket setting (5)	○	○	○	○	○	○	○
Shows different product (6)	○	○	○	○	○	○	○

Q9 Based on the picture that you have previously seen:



Q9.1 In your view, what time does the message focus upon?

Please select the time frame that, in your opinion, best describes the above message. The time frame varies from 1 ("now") to 7 ("in the far future"). While 8 indicates that there is no time indication.

	1. Now (1)	2. Very soon (2)	3. Soon (3)	4. In the near future (4)	5. In the future (5)	6. In the distant future (6)	7. In the far future (7)	8. There is no time indication (8)
The message focuses on my behaviour... (1)	○	○	○	○	○	○	○	○

Q9.2 To what degree do you think the display ...?

Responses range from 1 ("Not at all") to 7 ("Very much"). Please select the option that fits the best with your opinion.

	1. Not at all (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7. Very much (7)
Is clear (1)	○	○	○	○	○	○	○
Is understandable (2)	○	○	○	○	○	○	○
Is appealing (3)	○	○	○	○	○	○	○
Is realistic (4)	○	○	○	○	○	○	○
Describes a supermarket setting (5)	○	○	○	○	○	○	○
Shows different product (6)	○	○	○	○	○	○	○

Fine blocco: Control check (EN)

Inizio blocco: Personal values (EN)

Q10 These questions are not directly tied to the scenario previously described. They are related to your personal values and what you believe is important in your life.

To what extent do you follow the values described below as a guiding principle in your life?

Responses range from 1 ("Not at all") to 7 ("Very important"). Please select the answer that best represents yourself. How important is ... ?

	1. Not at all (1)	2. (2)	3. (3)	4. (4)	5. (5)	6. (6)	7. Very important (7)
having control over others in decision making? (1)	○	○	○	○	○	○	○
the accumulation of material possessions, such as money, to you? (2)	○	○	○	○	○	○	○
it to be in leadership positions in your personal and professional life? (3)	○	○	○	○	○	○	○
it to have a significant influence on people and events in your life? (4)	○	○	○	○	○	○	○
it to you that all people have equal opportunities and rights? (5)	○	○	○	○	○	○	○
it to maintain peace and prevent conflicts on a global scale? (6)	○	○	○	○	○	○	○
it to address societal injustices for you? (7)	○	○	○	○	○	○	○
it to help other people in your community? (8)	○	○	○	○	○	○	○

taking actions to prevent pollution for you? (9)	○	○	○	○	○	○	○
it to treat the Earth with respect for its natural beauty? (10)	○	○	○	○	○	○	○
it to you to feel a deep connection with nature and the environment in your daily life? (11)	○	○	○	○	○	○	○
it to actively protect the environment and preserving it for future generations? (12)	○	○	○	○	○	○	○

Fine blocco: Personal values (EN)

Inizio blocco: Demographics (EN)

Q11 What is your age (in years)? I am ... years old.

_____

Q12 What is your gender?

- ○ Male (1)
- ○ Female (2)
- ○ Prefer not to say (4)

Q13 What is your nationality? I am ...

_____

Q14 How many times per week do you go grocery shopping?

- 1. Never (1)
- 2. One day per week (2)
- 3. Some days a week (3)
- 4. Almost every day (4)
- 5. Every day of the week (5)

Q15 We thank you very much for your participation in this study!

If you would like to make any comments about this study, or provide other suggestions, please enter them below.

_____

Q16 For additional questions or comments, you can contact me Samuele Frà via the following email address: samuele.fra@wur.nl

Fine blocco: Demographics (EN)