Accelerating Consumer Adoption of Plant-Based Meat:

An Evidence-Based Guide for Effective Practice

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Abstract

Introduction
Plant-based meat has been commercially available for a number of years but is at a critical inflection point. Provided that plant-based meat products meet consumers' desired product expectations and are marketed effectively, they hold tremendous potential to meet a growing demand for a healthy, sustainable, and just protein supply. Plant-based meat is currently purchased by "early adopters" yet has the potential to quickly reach a larger, broader segment of the population. An evidence-based approach to developing and marketing these products will accelerate consumer acceptance and adoption of plant-based meat.

Objective
We conducted this comprehensive review in order to identify key influence strategies and to determine white space opportunities for further research. More specifically, the primary objective of this research project is to provide a practical resource to inform product development and marketing strategies for those working in the plant-based meat sector, as well as to provide a "launching point" for actionable research to identify further strategies to promote consumer adoption.

Method
Through a comprehensive literature review, we inductively determined the most effective strategies for accelerating consumer adoption of plant-based meat. Reviewed literature includes articles from multiple disciplines on the subject of plant-based meat and additional related topics that inform understanding in this new context. After the review and analysis of the full body of literature, we structured each working paper to provide top-line recommendations first and in-depth syntheses of the reviewed literature second.

Findings
This review has revealed that the best strategy for accelerating consumer adoption is first to understand consumer foundational and evolving motivations for food choice, as well as the differing strength of these factors by consumer segment. Once target consumer segments are determined, a cohesive strategy will include developing a product to meet these segments' unique needs and wants; structuring consumer purchasing environments to nudge toward specific, desired selection; and designing and disseminating messages to influence consumer behavior.

Conclusion
On the basis of the literature analysis, this series condenses an array of immediately actionable findings, including ones related to product development, structuring the purchasing environment, and messaging strategy. However, the literature review also uncovered numerous gaps in the research, which are outlined according to relevance in the chapters. Implementing the recommendations in this series and conducting further actionable consumer research will significantly accelerate consumer adoption of plant-based meat.

Table of Contents

SECTION A:
FOCUS ON THE CONSUMER

CHAPTER 01: Food-Choice Motivations

Key Findings and Recommendations

- This paper provides a synthesis of the available literature on food-choice motivations as they relate to protein choices and meat consumption. Part A describes general food-choice motivations. Part B describes drivers and barriers that influence consumers' decisions to reduce their meat consumption.

- The three foundational motivations for food choice are taste, cost, and convenience. Essentially, a food choice or product must first meet perceived needs for tastiness, affordability, and ease of purchase and preparation for the majority of consumers to consider it. Familiarity is an important purchasing driver for novel food products, such as plant-based meat.

- If these three core drivers are met, consumers then have the opportunity to incorporate their higher values into their food choices. Depending on consumer segment, these values include health, sustainability, or animal welfare. Taste, cost, and convenience are the foundation for these evolving food-choice drivers.

- Motivations to reduce meat consumption vary by consumer group. Health, weight loss, and cost motivate traditional meat consumers. Health is also the primary driver for current meat reducers (or flexitarians), with environmental impact and animal welfare as secondary drivers. Animal welfare, health, and environmental impact motivate vegetarians and vegans to abstain from meat consumption.

- Overall, health is a primary driver for reducing meat consumption among all three consumer groups (traditional meat consumers, flexitarians, and vegetarians and vegans). Traditional meat consumers and flexitarians appear more concerned about health than the environment and animal welfare, while vegetarians and vegans place high value on animal welfare.

- Barriers tend to weigh more heavily than perceived benefits in consumers' decisions to reduce meat consumption. Thus, barriers are difficult to overcome, while benefits may not sufficiently encourage reduction. The core barriers to reducing meat consumption are social norms and general enjoyment of eating conventional meat, health concerns (mainly about protein and other nutrients), lack of familiarity with alternative ways of eating, fear of new foods, and unwillingness to change dietary habits.

- The findings reviewed here suggest that developing plant-based meat products that are delicious, easy to purchase and prepare, familiar, and less expensive and healthier than conventional meat (with comparable protein content) will be an effective avenue to increasing plant-based meat consumption in the majority of the population. Marketing should promote these same benefits. Appeals to sustainability and animal welfare alone will be effective only for a small portion of the general population.

- Opportunities for traditional meat consumers to make sustainable, healthy, and just protein choices will increase as affordable, high-fidelity plant-based products reach the marketplace.

Introduction

To significantly shift meat consumption away from animal-based proteins to the more sustainable, healthy, and socially conscious plant-based proteins, we must first understand the underlying motivations for food choice generally, and for protein specifically.

Hunger is the universal and strongest driver of food consumption. However, when available food options are plentiful, numerous factors influence a person's decisions regarding *which* foods to eat. The European Food Information Council (2006) compiled a non-exhaustive list of the factors that affect food choice: biological determinants (hunger, appetite, taste preferences), economic and physical determinants (cost, income, availability, access, education, skills, time), social determinants (culture, family, peers, habits), and psychological determinants (mood, stress, attitudes, beliefs, and knowledge about food). Similarly, Apostolidis and McLeay (2016a) noted that a variety of factors determine food choices, including the food-choice environment; individual preferences for food attributes; and individual habits, motivations, and values.

Once a consumer's basic food-choice drivers of taste, cost, and convenience are met, the individual has the opportunity to make food choices that align with higher, more aspirational values, such as health, environmental impact, and animal welfare. In other words, only after a food product is perceived as delicious, affordable, and accessible will the average consumer consider its health benefits, environmental impact, or impact on animals in the decision to purchase it. However, the aspirational value underlying the desire to purchase will differ for each consumer segment (see Working Paper 2).

Overall, the foundation of food choice can be thought of as comprising the three core motivators of taste, cost, and convenience, with the more ambitious motivators mattering less. This creates a "food-choice pyramid" structure in that, for the majority of consumers, health benefits, environmental impact, and animal welfare are unlikely to exist as influential food-choice motivators without the foundational three.

Shaping interventions that account for the individual and group differences in food-choice and meat-reduction motivations and perceptions across a population is important to the goal of reducing meat consumption via substitution with plant-based meat. Interventions and messages that appeal to specific groups tend to be more effective than messages aimed at the general public or the "average consumer." *Targeted* messages focus on understanding and influencing the shared characteristics of a population's subgroups (Kreuter & Wray, 2003) and may contribute to consumer adoption of plant-based meat.

This paper, which will be the first in a series on consumer attitudes and behaviors toward plant-based meat products, provides a synthesis of the available literature on food-choice motivations. In particular, this paper focuses on consumers' protein choices and their decisions to reduce or not to reduce meat consumption. This and other papers in the series will be periodically updated to ensure that the latest research is available to readers.

Part A describes the motivations that influence general food choice, as well as motivations and food attribute preferences that specifically influence meat consumption choices. Food-choice motivations vary considerably among individuals and groups. Part B describes drivers and barriers that influence consumers' decisions to reduce—or not to reduce—their meat consumption. These drivers and barriers also vary by individuals and consumer segments. Plant-based product development should seek to meet these drivers and address these barriers so that consumers increasingly have opportunities to choose a product that is not only tasty, affordable, and convenient but healthier, more sustainable, and just.

Part I: Food-Choice Motivations

This section begins with an examination of the underlying drivers for general food choice, which include both traditional and evolving drivers. Then this section examines motivations for meat choices.

Motivations for General Food Choice

Taste, personal health, cost, and convenience motivate general food choice for most of the population. Each of these motivations provides clear physical or practical benefits to the individual. While innate biological taste preferences often determine food choice, both personal experiences and cultural food norms may shape these preferences to some extent (Mela, 2001). Some consumers are also motivated by altruistic factors, such as concern for the environment or animals. Importantly, food-choice motivations *vary in degree of influence* depending on the individual, but general patterns emerge within certain consumer groups.

Food-choice motivations are typically studied through online consumer surveys, which are best-suited for understanding attitudes rather than for perfectly predicting behavior. However, in conjunction with a host of other factors, such as normative beliefs, perceived self-efficacy, and environmental determinants, attitudes are considered important components amid the multitude of variables that influence behavior (for examples of foundational literature, see Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Cappella, 2006). Importantly, though, when consumers are under time, sensory, and cost pressures (among other pressures), food choices are often less aspirational. Below we outline two types of drivers: foundational (i.e., taste, cost, and convenience) and evolving (i.e., health and nutrition, sustainability, impact on the environment and animals). Typically, the foundational drivers must be met—in order of taste and then cost or convenience—before consumers will make "aspirational food choices."

Foundational Drivers

Recently, the International Food Information Council conducted a survey on food-purchase drivers among a representative 1,012 U.S. residents (IFIC, 2019). Results were consistent with previous years' surveys (IFIC, 2017; IFIC, 2018): Taste was the primary motivator of reported food decisions. Participants reported cost as a close second, followed by healthiness, convenience, and sustainability of food products. In fact, a choice experiment by Malone and Lusk (2017) found that consumers were willing to pay more for an improvement in the health and safety of conventional meat but not as much more as they would for an improvement in taste. These findings that taste is the number one motivator are consistent with other studies on food motivations: (Aggarwal et al., 2016; Deloitte, 2016; Flynn, 1999; Glanz et al., 1998; Hoek et al., 2017).

Aggarwal et al. (2016) assessed the importance of taste, nutrition, cost, and convenience in driving food choice in an analysis of data from a large U.S. representative sample and found results similar to those of IFIC (2018). Taste was again the top driver, with 97.8% of consumers across all groups rating it as somewhat or very important to their grocery store food purchases. Nutrition was also somewhat or very important to a majority of participants (95.7%), although ratings were highest among women and older adults. Most participants rated cost as somewhat or very important (88.8%), although cost was far more important to adults with lower income and education than to other groups. Convenience and ease of preparation were somewhat or very important to 76.9% of the sample, although these were more important among groups with the lowest income and education.

Earlier studies in both the U.S. and Europe showed similar results. In a national sample of U.S. adults, Glanz et al. (1998) asked consumers to rate factors in terms of their influence on food choice. Taste was the strongest factor

(4.7 on a five-point scale), followed by cost (4.1), nutrition (3.9), convenience (3.8), and weight control (3.4). However, these drivers varied in their influence across different groups. Nutrition was most important to older participants and women. Cost and convenience were most important to those who were younger and of lower income. Cost was also important to women, and weight control was important to women and older participants.

Taken together, research findings around the primary drivers for food choice and consumption highlight the foundational nature of these motivations. Essentially, if consumers expect that a product won't taste good, then 95% of them are unlikely to purchase or eat it (IFIC, 2018; question not asked in the 2019 survey). Along these same lines, if a product is unaffordable, consumers will not purchase it simply because they are unable to. Once plant-based products meet these primary—that is, foundational—drivers, opportunities for consumers to make food choices aligned with other stated values, such as health, environmental impact, and animal welfare, will abound.

Evolving Drivers

A recent market survey of 5,000 U.S. consumers found that 49% were strongly motivated by "traditional" drivers of food choice (i.e., price, taste, convenience), while 51% were strongly motivated by "evolving," or untraditional, factors, such as health and wellness, safety, social impact, and familiarity (Deloitte, 2016). The report notes the continued high importance of traditional drivers for the foreseeable future, with both traditional and evolving drivers making up the "full plate of influence when considering the drivers of consumer purchase decisions" (p. 2). As traditional drivers are met by an increasing number of consumer options, these evolving drivers increase in importance.

This new emphasis on evolving drivers existed across all product categories. In the meat, fish, and poultry purchase category, evolving drivers were important to 49% of consumers. The most important driver in this purchase category related to health and wellness and included considerations such as nutritional content, ingredients' status as natural or artificial, and production methods' status as organic. Additionally, transparency was important to both "traditional" and "evolving" consumers. The IFIC (2019) survey also highlights this increased importance of evolving drivers: Over 60% of consumers reported sustainability as having a moderate to major impact on their purchasing decisions (up from 37% in 2018). In both 2018 and 2019, 37% of participants sought to purchase food labeled "natural" (IFIC, 2018, p. 46; IFIC, 2019).

The Deloitte (2016) survey found that evolving drivers were important across demographic groups: U.S. geographic region, gender, age, and income. Consumers with a stated preference for evolving drivers were more likely to seek information about food on social media than those who preferred traditional drivers—32% versus 16%—and were less trusting of large brands in terms of safety, transparency, health and wellness, and social and environmental responsibility. Although consumer groups showed different strengths of evolving-driver preferences, these preferences remained steady across demographic groups.

Of relevance to both traditional and evolving drivers, Hoek et al. (2017) conducted a 16-set choice experiment in Australia that examined the impacts of price differences, health labels, and environmental labels across three product types (white versus brown rice, conventional versus organic tomatoes, beef versus kangaroo meat). Consumers were more likely to shift to the more sustainable product when the alternative was more familiar and liked. The hardest to sway were consumers who were more strongly attached to taste and convenience attributes. Decreasing price more greatly shifted consumer choices than did health and environmental labels. Overall, the study showed the importance of developing products that (1) meet sensory expectations, such as taste; (2) are price-competitive; and (3) are familiar and convenient to purchase and prepare.

Food-Choice Drivers: Conclusions

In sum, the relative influence of food-choice drivers varies among groups and individuals, but several factors remain influential across demographic groups. Generally, these more foundational motivations can be categorized as fulfilling immediate wants and needs (e.g., taste, familiarity, convenience) or providing a personal benefit (e.g., cost savings, health). Increasingly, many consumers are also driven by longer-term motivations (e.g., health, wellness, safety), food experience and social influence, and more-altruistic motivations (e.g., environment, animal welfare). The studies summarized in this section provide a brief overview of general food choice. Next we turn to studies that specifically examine motivations for choosing conventional and plant-based meat products.

Motivations for General Food Choice

We now turn to consumer drivers of meat choices in particular. McCarthy et al. (2004) surveyed Irish consumers about their beliefs regarding the health, safety, and enjoyment of eating pork and poultry, as well as their concerns about price, animal welfare, and the environment. The findings indicated that enjoyment of food, safety, and health were their primary motivations for consuming conventional meat, and concerns about the environment, animal welfare, and price were secondary. With respect to plant-based meat, Bryant, Szejda, Parekh, Deshpande, and Tse (2019) found that attitudinal predictors of purchase intent varied by country. In the U.S., predictors included perceived appeal, excitement, and low disgust. In China, predictors included perceived healthiness, appeal, tastiness, and sustainability. In India, perceived sustainability, excitement, necessity, and goodness predicted purchase intent. The studies lend support to the idea that traditional and evolving drivers are at play in both plant-based and conventional meat consumption. However, many studies have assessed motivations to consume conventional meat within population segments, lending a more nuanced view of these drivers. Understanding protein-choice motivations in the general consumer population and in subgroups will provide important information for the development of effective targeted and tailored messages to consumers.

Consumer Segments and Their Meat-Choice Motivations

Today, per capita total meat consumption is among the highest in U.S. history (USDA ERS, 2018). It is important to note, however, that per capita data do not reflect the consumption patterns of different consumer segments (Fehrenbach, Righter, & Santo, 2016). Consumer segmentation studies that have assessed meat consumption typically identify three basic consumer groups: (1) traditional meat consumers, (2) meat reducers, and (3) meat avoiders. Motivations for both animal-based meat and plant-based meat choices vary considerably among these groups. Both traditional meat consumers and meat avoiders hold strong—and different—preferences, while meat reducers hold weaker preferences and share motivations with the other two groups. We discuss the differing motivations, as well as the resulting desired product attributes, in detail below.

Multiple studies have identified the motivations of the three groups. In one qualitative consumer segmentation study in Portugal, Graça et al. (2015b) identified three consumer profiles based on emotional connection with conventional meat and willingness to change dietary habits. Almost half (49%) the sample revealed a pattern of "attachment" to meat consumption. These traditional meat consumers expressed a strong affective connection to meat, were more resistant to dietary change, and held rationales for avoiding dietary change. The second-largest group (37%) revealed a pattern of meat "avoidance." These individuals expressed a low affective connection to meat and were willing to change their diets for health or animal welfare. Lastly, 14% of the sample evidenced a pattern of "disgust" toward meat. This group did not report eating meat, reacted to meat with disgust, and expressed concern over harm imposed on animals. The authors acknowledged that their online survey and recruitment methods may have contributed to a bias in participant demographics, as a majority of their

respondents were female, under 40, and living in an urban area at the time. Additionally, 13.7% of participants identified as vegetarian or vegan, and 13.5% of the sample reported regular consumption of "faux meat" products. This unrepresentative sample may have skewed the number of participants within each consumer profile. However, the consumer profiles themselves are distinct "patterns of response," which are valid constructs irrespective of the number of participants in each. These should be further tested using a representative sample (Graça et al., 2015b, p. 88).

Apostolidis and McLeay (2016b) conducted a choice experiment among U.K. consumers to assess the importance of various attributes of meat products. This study required participants to weigh numerous tradeoffs in their food purchasing decisions (e.g., fat content, environmental impact, production method, meat type, brand, origin location, and price). For example, a participant was presented with four meat choices, each of which varied across the aforementioned factors, and asked to choose which they would purchase. After the experiment, the authors created six consumer categories based on primary preferences across meat attributes. These consumer categories were "price conscious" (45%), "green" (17%), "taste driven" (15%), "healthy" (11%), "organic" (10%), and "vegetarian" (6%). The authors further divided these groups on the basis of demographics such as age, gender, income, and household type. For example, "green" consumers were predominantly female and between the ages of 18 and 34. The typical "healthy" consumer was female and over 55. The study supports the conclusion that meat-choice motivations vary among individuals and groups: Price was a predominant factor for nearly half the sample; however, other factors, such as environmental concerns, taste preferences, and health concerns, were the primary drivers for other consumer segments.

In a qualitative study of U.K. consumers' motivations to consume plant-based meat, Apostolidis and McLeay (2016a) found patterns of meat consumption consistent with those of the Graça et al. (2015b) classification study in Portugal. Apostolidis and McLeay (2016a) classified consumers as meat eaters, meat reducers, and vegetarians. Vegetarians' food choices were heavily influenced by ethical concerns relating to animal and human welfare, but traditional meat consumers also held these broader concerns; their concerns were only weaker. Because traditional meat consumers hold the same ethical concerns as vegetarians, they may be receptive to plant-based meat under the right conditions. The arrival of new high-fidelity plant-based products to the marketplace will create more frequent opportunities for traditional meat consumers to choose healthier, sustainable, and just proteins.

Motivations for Consuming Plant-Based Meat

Parry and Mitchell (2019) assessed the general population's perception of plant-based products in a study of 2,518 U.S. consumers. The study used implicit testing to identify the greatest drivers of purchase behavior and how perceptions of plant-based foods differ among demographic groups. To determine the attributes most likely to increase purchase intent, the authors correlated data from a product purchase intent test (assessing which plant-based products consumers would most likely purchase) with data from a product associations test (assessing the attribute associations that consumers hold with plant-based products).

Taste was the strongest motivator of purchase intent. Familiarity and tradition were also highly influential in motivating consumers to purchase plant-based products. These were followed by the need for the products to be fresh, nutritious, and healthy. Altruistic attributes, such as sustainability and animal welfare, were less important to consumers and much less likely to influence purchasing decisions. While these motivations were fairly consistent across all demographic groups, some differed in the strength of their influence according to age and dietary behavior. Millennials were more likely to be influenced by product availability (convenience) and environmental impact, while older generations were more likely to be influenced by taste and familiarity. In terms of dietary behavior, flexitarians were more positively influenced by health considerations, as well as animal

welfare and environmental impact, while omnivores had more of a desire for the products' sensory properties to closely resemble those of conventional meat.

Food-Choice Motivations: Conclusion

Overall, the reviewed research establishes foundational food-choice motivations (taste, cost, and convenience) and underscores their precedence over values-based motivators (health, sustainability, and animal welfare) for most consumers. Health is a personal benefit with longer-term impact, and while important for many consumers, it also falls below foundational, immediate-benefit motivations in importance. While the foundational food-choice drivers are indeed important, all food-choice motivations will differ depending on consumer segment, and evolving drivers have been shown to be increasing in importance.

The literature supports segmentation of consumers into three groups: traditional meat consumers, flexitarians (i.e., meat reducers), and vegetarians. Various studies note that "strict vegetarians," or "vegans," make up about 2% of the population (ACE, 2018; Gallup, 2018; Pew, 2016) and that two-thirds of U.S. consumers report reducing consumption of one or more types of conventional meat (Neff et al., 2018). However, these reducers do not decrease meat consumption equally (see Part B and Working Paper 2). Traditional meat consumers, or those not reducing their meat consumption, are primarily motivated to consume conventional meat because of taste, price, and their affective connection to it. Vegetarians are most commonly motivated by ethical concerns. Flexitarians, who occasionally include conventional meat in their primarily vegetarian diets, are situated in the middle, sharing the motivations (albeit more weakly) of the other groups. However, the flexitarian segment more closely resembles traditional meat consumers than it does vegetarians or vegans. This resemblance will be discussed in further detail in the next section.

So that producers and marketers can most effectively target consumers, future research in this area should utilize segmentation studies and, where possible, focus on studies of actual behavior rather than self-reported behavior (see Working Paper 2 for a review of the literature). In addition, studies on U.S. consumer segments' motivations around meat are notably lacking, so this is another area for future research. Consumer motivations around protein choice may differ according to culturally specific values, media, and social norms, but the emergence of three distinct consumer segments across multiple studies in various countries and cultures suggests that successful interventions to promote plant-based meat adoption in one country may be scaled to other countries.

Part II: Drivers and Barriers to Reducing Meat Consumption

This portion of the working paper will review the literature that outlines drivers and barriers to reducing meat consumption so that plant-based meat products can leverage general reduction motivators and remediate reduction difficulties. Overall, the primary motivation to reduce consumption appears to be health benefits, with environmental and animal welfare benefits as secondary motivations. However, significant barriers to reduction exist as well. Consumers generally perceive reduction to be difficult, inconvenient, unenjoyable, and unhealthy, especially in conventional meat's perceived protein value. Plant-based meat companies should seek to address these concerns with their products.

Drivers for Reducing Meat Consumption Among Consumer Groups

The drivers for reducing meat consumption vary by consumer segment (delineated in the previous section). Generally speaking, traditional meat consumers are motivated to reduce their intake for health reasons. Flexitarians are also motivated to reduce consumption for health reasons, as well as animal and environmental welfare. Vegetarians and vegans are also motivated by animal welfare and the environment but more passionately than flexitarians. As the food-choice environment shifts over time, these motivations may also shift.

Traditional Meat Eaters

A significant portion of the general meat-eating population is already reducing its meat consumption. In the most recent study on meat reduction prevalence in the U.S., about two-thirds of the general population reported reduction of at least one type of conventional meat in the past three years (Neff et al., 2018). An important caveat to the Neff et al. (2018) findings is that consumers are not necessarily reducing their total meat intake. Fifty-five percent of the reducer sample decreased its red and processed meat consumption, and of these reducers, 37% increased their seafood and poultry intake (Neff et al., 2018). Overall, only 10% of the reducers reported decreased consumption of all four categories of conventional meat (poultry, seafood, red meat, and processed meat). This highlights the complexities within the reducer segment. Despite these nuances, this nationally representative poll found that half of these reducers cited cost (51%) and health or both (50%) as main drivers for reduction. Moreover, some of these respondents cited environmental concerns (12%) and animal welfare (12%) as reasons for reducing meat consumption. A cross-sectional study among U.S. college students, who identified health and weight loss as top advantages of a plant-based diet, yielded similar results (Wyker & Davison, 2010).

Consumer surveys outside the U.S. have also identified cost as a primary motivator (Garnett, Mathewson, Angelides, & Borthwick, 2014) and health as a primary motivator to reduce meat consumption, with environmental and animal welfare motivations as secondary (Wyker & Davison, 2010). In a large-scale online survey of Finnish consumers, Latvala et al. (2012) found that about 48% of respondents had no intention to change their meat consumption habits, 13% had already reduced their intake of beef and pork (but not chicken), and 39% were in the process of reducing meat intake. Similar to the Neff et al. (2018) and Wyker and Davison (2010) findings, motivations for reducing consumption were primarily health and weight concerns, with sustainability and ethics as secondary drivers. The Lentz et al. (2018) study of New Zealand consumers also suggested that price and health were the primary drivers for "standard" consumers to reduce meat consumption, with ethical concerns (e.g., environment and animal welfare) being secondary motivations. Similarly, Lea and Worsley (2003) found that an Australian general-population demographic identified health as the strongest benefit associated with a vegetarian diet. More specifically, participants considered that vegetarian diets increased fruit and vegetable consumption, decreased saturated fat intake, and better controlled weight and prevented disease. They also identified animal welfare as an important benefit, although notably, this motivation was again secondary to health benefits. Holm and Møhl (2000) identified concerns about bacterial contamination and animal welfare, along with low meat quality and concealed processing practices, as motivations to reduce meat consumption in Danish families. Finally, Graça et al. (2015a) found that their Portuguese sample saw health benefits as a primary motivator to reduction.

These findings suggest that price, overall health, and weight loss may be effective avenues for promoting plant-based meat consumption in the traditional meat-consuming U.S. population. Further product development strategies, including improving sensory properties of plant-based meat, are discussed in Working Paper 3.

Flexitarians

Flexitarians more closely resemble traditional meat consumers than they do vegetarians and vegans in terms of food-choice motivations (De Backer & Hudders, 2015; Lentz et al., 2018; Neff et al., 2018; Verain et al., 2012). Like the traditional consumers, flexitarians emphasize health concerns, with environmental and animal welfare concerns as secondary motivators (De Backer & Hudders, 2015; Forestell et al., 2012; Neff et al., 2018). However, there are some differences. Lentz et al. (2018) found that health benefits were more important for flexitarians than for traditional meat consumers. In a different interview study, de Boer et al. (2017) found that low and medium meat consumers (which we categorize here as flexitarians) cited dietary variation, health, and environmental impact as reasons for infrequently consuming conventional meat. Moreover, flexitarians were more motivated by environmental and animal welfare concerns, as well as weight control, than were typical meat consumers. Similarly, Graça et al. (2015b) found that health and animal welfare were strong motivators for reducing consumption for those who were not attached to conventional meat.

The results from studies reviewing flexitarian drivers for meat reduction strongly suggest a continued main focus on health in reduction interventions, with secondary foci on environmental impact and animal welfare.

Vegetarians and Vegans

Vegetarian and vegan consumers' motivations for abstaining from conventional meat differ from those of flexitarians and traditional meat consumers. Specifically, vegetarians and vegans are highly driven by concerns about animal welfare, although health and sustainability are also of concern. Several studies provide evidence for this point. Janssen et al. (2016), for instance, found that the majority of vegans in Germany were motivated by a concern for animals (90%) and health (70%), while only about half were motivated by environmental concerns (47%). Similarly, Graça et al. (2015) identified that consumers with a low negative affective connection to meat ("meat avoiders") were willing to change their diets for both health and animal welfare reasons. Lastly, in their interview study, de Boer et al. (2017) identified disliking meat, animal welfare, environmental impact, and health as vegetarians' main motivations for abstaining from meat consumption.

Dietary motivations also change over time. Research on vegetarians suggests that while animal welfare concerns are often primary, secondary motivations for abstaining from conventional meat (usually concerns for one's health and the environment) often strengthen over time (Fox & Ward, 2008). Similarly, Barr and Chapman (2002) surveyed women who were either vegetarians or former vegetarians. Of the vegetarians, about half reported that their diets became more restrictive over time. Former vegetarians were motivated to return to meat consumption because of health and nutrition concerns, a change in lifestyle, or missing the taste of conventional meat. These findings highlight the double-edged nature of health beliefs as a reason to consume both plant-based and conventional meat, discussed further in Working Paper 3.

Barriers to Reducing Meat Consumption

While drivers for reducing meat consumption are important for us to understand to effectively develop and promote plant-based meat products, barriers are similarly vital to address because they inhibit the positive effect of these drivers. Barriers to reduction have been explored extensively. In a scoping review, Corrin and Papadopoulos (2017) found that, across a range of countries, barriers to reduction included health concerns, unwillingness to make dietary changes, and enjoyment of eating conventional meat. Other barriers included fear of new foods, beliefs about masculinity, and convenience (e.g., Lea et al., 2006; Rothgerber, 2013). Indeed, one study of Finnish consumers found that 61% of participants agreed that eating meat was enjoyable, 47% agreed that meat was a necessary part of human nutrition, 58% agreed that they would rather eat familiar foods, and

33% agreed that it was more difficult to make vegetarian meals (Pohjolainen, Vinnari, & Jokinen, 2015). The significance of these barriers appears to differ across demographics. These barriers were most significant among those already eating high amounts of conventional meat, those who were male and young, those who lived in a rural setting, those who had children, those who were less educated, those who had no social or family connections with vegetarians, and those who valued tradition (Pohjolainen et al., 2015).

Barriers to reduction are often more influential than drivers. Those who care about animal welfare, health, or the environment do not always act in alignment with their beliefs and values. Researchers have coined the term "meat paradox" to describe how some people, for example, care deeply for certain animals (e.g., dogs, cats) but eat other animals (Herzog & Foster, 2010; Joy, 2011). While feelings of guilt or ethical inconsistency might otherwise drive a reduction of animal-meat consumption, numerous barriers maintain the meat paradox. In a series of five studies, Piazza et al. (2015) found empirical evidence for four common rationalizations that traditional meat consumers use to justify eating animals, thereby reducing cognitive dissonance and feelings of guilt (Cooper, 2007; Festinger, 1962). These internalized and socially expressed justifications act as barriers and have been called the *4Ns*: *natural*, *necessary*, *normal*, and *nice*. *Natural* refers to the role that eating meat plays in terms of biology and human evolution. *Necessary* refers to the perceived need to consume animal meat for survival, including for strength, health, and economic stability. *Normal* refers to eating meat as a widespread normative behavior, in both current and past societies. *Nice* refers to the hedonic qualities of eating meat—that meat tastes good and is fulfilling and satisfying. To the extent that these justifications can be effectively challenged (through, for instance, plant-based meat developed and positioned as healthy and natural), significant barriers may be reduced.

Nutritional and Health Beliefs

One commonly cited barrier is the belief that conventional meat is a necessary component of a healthy diet and plant-based diets are nutritionally deficient (IFIC, 2019). As noted previously, Pohjolainen et al. (2015) found that 47% of participants in their survey believed that meat was a necessary part of human nutrition. Further research determined that people who consumed meat considered it healthy and a good source of nutrients (Apostolidis & McLeay, 2016b; de Boer et al., 2017; Lea & Worsley, 2001; Verbeke et al., 2010). Verbeke et al. (2010) found that in responses from several focus groups and a large-scale consumer survey in several European countries, meat was perceived as healthy and important. In line with this finding, Barr and Chapman (2002) found that traditional meat consumers who were cutting back on their consumption were still likely to hold positive beliefs about animal products, including that animal products are the more nutritious option. Similarly, Wyker and Davison (2010) discovered that in a U.S. sample the greatest barrier to adopting a plant-based diet was concern about lack of protein and other nutritional deficiencies. Additionally, health concerns varied by gender. Specifically, men were more concerned with muscle loss, while women were concerned with nutrition.

Perceptions that conventional meat is healthy appear to be highly predictive of a reluctance to reduce consumption. Apostolidis and McLeay (2016b) found that both meat consumers and meat avoiders valued their health, but compared with meat avoiders, meat consumers held stronger beliefs that meat was healthy. Accordingly, health concerns are considered a barrier to reduction for this group. Similarly, Lea and Worsley (2001) found two very strong predictors of meat consumption: the belief that a vegetarian diet is unhealthy and the belief that meat is healthy and not a cause of diseases (such as cancer and heart disease).

Bohm, Lindblom, Åbacka, Bengs, and Hörnell (2015) analyzed behavior in a Swedish classroom and found results that supported these points. In discussions about food, meat was described as central to nutrition, as well as to sensory experience, culture, and relationships. For example, meat was always listed first in discussions of high-protein foods. The authors also identified a minor alternative narrative: the idea that meat was threatening

to health. However, when this alternate message was prompted (such as by noting the health advantages of reduction), students reported preferring to eat leaner meat rather than less meat. The results suggest that those who already consumed conventional meat saw it as healthy, and this was identified as a key barrier to reduced consumption.

Environmental Beliefs

Beliefs about environmental impact are another potential barrier to meat reduction. Individuals may lack the awareness of, or be resistant to accepting, the impact of meat consumption on the environment. In a review of the dietary habits of people in numerous European countries, Hartmann and Siegrist (2017) found that many consumers were unaware of conventional meat's environmental impact. The authors surmised that this lack of awareness might explain, at least in part, consumers' unwillingness to reduce their consumption. While awareness of conventional meat's environmental impact may not be sufficient to change behavior, a large body of behavioral change research identifies knowledge as one of the many factors that predict behavior change, along with attitudes, self-efficacy, and demographics, for instance (e.g., Ajzen, 1991; Fishbein & Ajzen, 2010).

Macdiarmid, Douglas, and Campbell (2016) conducted a qualitative study in Scotland that explored consumers' understanding of the links between meat production and the environment. Through 12 focus groups and four individual interviews, they identified three dominant themes: (1) lack of awareness of the association between meat consumption and climate change, (2) perceptions that personal consumption plays a minimal role in the global context, and 3) resistance to the idea of reducing personal consumption. Similarly, other studies have found that most people are unsure of the link between meat production and environmental impact or believe that the impact is low (Pohjolainen, Tapio, Vinnari, Jokinen, & Räsänen, 2016; Tobler et al., 2011).

Thus, it appears that many consumers are not sufficiently aware of the degree to which meat production is associated with environmental impact. An important difference between health and environmental belief barriers is that some consumer segments believe that conventional meat is bad for health, while some consumers think that it is good for health (see Working Paper 3). For environmental concerns, consumers do not tend to hold similarly contradictory beliefs. Rather, consumers tend to have differing strengths of beliefs about the level of negative environmental impact. Taken together, the results suggest that segmenting consumers in accordance with the strength of their environmental beliefs and raising awareness of the environmental impacts of meat production may be useful. It should be noted that environmental messaging will probably not be effective when targeting consumer groups with low concern for the environment. In fact, research has found higher rates of meat consumption among consumers who report less concern for the environment (Pfeiler & Egloff, 2018). Accordingly, these ideas should be applied with caution, as educating individuals about the connection between consumption and environmental impact will influence only a segment of the reducer population. As mentioned, awareness is indeed one of many antecedent factors for behavior change, so for the small consumer segment with high environmental concern, awareness should play a role in influencing plant-based meat consumption. However, in congruence with behavioral change models, awareness alone is unlikely to be sufficient for behavior change (Ajzen, 1991; Ajzen & Fishbein, 1980; Fishbein & Cappella, 2006), especially when the foundational drivers of taste, price, and convenience are not met. In sum, environmental messaging is likely to have only limited effect and should not be relied on as the primary influence strategy.

Convenience and Self-Efficacy

Both the perceived convenience of eating conventional meat and one's perceived inability to make dietary change have been identified as barriers to reducing consumption (IFIC, 2019). In a large-scale study, Lea et al. (2006) surveyed 415 Australian adults. The authors found that the common barriers to adopting a plant-based diet

included an unwillingness or inability to alter dietary patterns and a lack of available options when eating at restaurants. (Younger people were more likely to cite lack of information as a barrier to reducing consumption, while older people were more likely to cite an unwillingness to alter their diets). In contrast to previous work, health was not considered a major barrier to reducing consumption in this particular study. However, the sample overrepresented older, female, and educated participants. Thus, it is not likely to fully reflect the motivations of the general public.

Pohjolainen et al. (2015) found that 33% of consumers thought it more difficult to make vegetarian meals than meals containing conventional meat. Beyond the logistical convenience of purchasing and preparing vegetarian meals, research finds that social issues can be a barrier to reducing consumption. Lea and Worsley (2003) found that perceived social difficulties (i.e., challenges with "fitting in" with traditional meat eaters in social settings) associated with eating vegetarian were also predictors of meat consumption, along with concerns about convenience and a lack of knowledge regarding eating vegetarian. However, these were found to be less predictive than health concerns about reduced consumption and high appreciation for conventional meat.

The Joy of Meat

Another potential barrier to reducing consumption is hedonism, which broadly refers to the enjoyment that people experience when eating meat (Piazza et al., 2015). A combination of factors, including taste and a feeling of fulfilment and satisfaction, contributes to this enjoyment (Piazza et al., 2015). In line with this, many other studies have identified taste and enjoyment of meat as major barriers to reducing consumption (Apostolidis & McLeay, 2016b). Lea and Worsley (2003) surveyed a broad Australian demographic, finding that "enjoying eating meat" was the strongest barrier to adopting a vegetarian diet. Notably, this persisted despite participants' acknowledgement of the benefits of a vegetarian diet. For reducers, taste may also be a barrier to continuing their flexitarian diets. Barr and Chapman (2002) surveyed current and former vegetarian women and non-vegetarian women in Canada. Former vegetarians cited taste as the secondary reason (after health) for returning to meat consumption. This suggests that sensory properties are a barrier not only to reduction but also to continuation of their adjusted diets.

Food Neophobia

Food neophobia refers to a "reluctance to eat and/or avoidance of novel foods" (Pliner & Hobden, 1992, p. 105). While plant-based meat may be more similar to animal-based meat than other plant-based protein sources (e.g., tofu, tempeh), it is still a novel food. Reluctance to try new foods is a significant barrier for some individuals. For example, a study of consumers in the U.S., India, and China (N = 3,030) found food neophobia to be a significant negative predictor of intention to purchase plant-based meat, suggesting that food neophobia may be a barrier to consumers' willingness to try and purchase plant-based meat. Essentially, the lower one's food neophobia, the more they intend to purchase plant-based meat (Bryant et al., 2019). In this specific study, the percentage of consumers with high food neophobia differed by country, with 23.8% of U.S. participants, 19.8% of Indian participants, and 13.8% of Chinese participants reporting moderately high to high food neophobia (e.g., a mean neophobia score above three out of five). These percentages provide insight into the number of consumers who will be more difficult to sway to adopt plant-based meat. Additionally, in a survey of consumers in the U.K. and Netherlands, Hoek et al. (2011) found that individuals who reported not eating plant-based meat also reported a general avoidance of new foods. Moreover, Pohjolainen et al. (2015) found that 58% of their study's sample did not adopt a plant-based diet because of their preference for eating familiar foods.

Food neophobia may be a particularly difficult barrier to overcome, because it prevents product tasting. Pliner and Hobden (1992) argued that the effectiveness of interventions to address neophobia is likely to vary in

accordance with an individual's level of neophobia. Behavior change among those with strong neophobia will be exceptionally difficult. However, in an experiment in which 327 German participants rated their attitudes toward, willingness to try, and taste expectations of four different soy products, neophobic consumers rated products familiar to them higher on all ratings than unfamiliar products (Fenko et al., 2015). Thus, strongly neophobic consumers could be late adopters of plant-based meat. Familiarity with it may increase over time, if information about how it resembles familiar foods is provided and exposure to the product itself is increased (Tuorila et al., 1994).

Meat Attachment

Attachment to conventional meat has been identified as a barrier to reduction. An online study conducted by Graça, Oliviera, and Calheiros (2015a) asked Portuguese participants to answer survey questions and complete word association tasks. In accordance with their responses, the authors categorized participants into one of three meat attachment types: (1) those who held feelings of disgust toward meat, (2) those who exhibited an avoidance of meat, and (3) those who had an attachment to meat. Both meat eaters and those with a disgust response had highly affective responses to conventional meat, but meat eaters held a positive emotional valence to it, while those with a disgust response held a negative emotional valence. The third category, meat avoiders, demonstrated a low-intensity negative affective response. Notably, traditional meat eaters exhibited dependency and feelings of sadness and deprivation when asked to consider abstaining from consumption. The attachment group resisted dietary change and held rationales for avoiding change—for example, that they enjoyed eating conventional meat or that the meat industry's harm was "not their fault" (p. 84). In contrast, those who held a disgust response reported repulsion and moral internalization with expressed concern of harm toward animals. Finally, exposure to information about the negative impacts of conventional meat (on the environment, animal welfare, and health) was not sufficient to change the attitudes of those who showed strong meat attachment. Thus, development and testing of interventions should carefully consider consumer segments.

Bryant et al. (2019) found meat attachment in the U.S. to be a strong negative predictor of intention to consume plant-based meat. However, the same study found that meat attachment was not a significant predictor of plant-based meat purchase intent in India and was a positive predictor of purchase intent in China. These findings suggest that meat attachment can be a strong emotional response that influences individuals' behavior beyond their general attitudes and beliefs but that cultural differences should be taken into account when segmenting consumers.

Masculinity Beliefs

Meat consumption is tied to masculinity (e.g., Adams, 2010; Buerkle, 2009; Nath, 2011; Rozin et al., 2012; Rothgerber, 2013; Vartanian, 2015) and specifically associated with a more "traditional" viewpoint of masculinity (Schösler et al., 2015). Using an experimental design, Thomas (2016) found that omnivores perceived both male and female vegans to be less masculine than omnivores. Similarly, Ruby and Heine (2011) found that both omnivores and vegetarians rated vegetarians as less masculine than omnivores. Ruby (2012) found that women were more likely to be vegetarian and express greater concern for animal welfare than men.

Masculine ideals appear to relate directly to meat consumption. Rothgerber (2013) surveyed U.S. undergraduates about their masculinity, meat-eating habits, and meat-eating justifications. Those who were higher in self-rated masculinity tended to justify eating conventional meat in a number of ways. They endorsed pro-meat attitudes, denied animal suffering, stated that animals were lower in the animal kingdom than humans, claimed that human fate was to eat animals, and cited religion and health as additional or sole justifications. Those low in self-rated masculinity tended to use indirect strategies, such as dissociation from responsibility of the harm caused by meat

consumption. Notably, the relationship between masculinity and justification style was independent of sex, although more men than women engaged in masculine justifications. Moreover, male strategies and pro-meat attitudes were generally correlated with more consumption, and female strategies were associated with less consumption. This suggests that pro-meat attitudes are related to the self-reported construct of masculinity rather than to sex itself. Consumer segmentation studies have often associated men with higher meat consumption and justification, but this study uncovered a crucial distinction: The underlying barrier is the social construction of masculinity.

These findings suggest an important opportunity for interventions to shift subjective norms around gender, masculinity, and diet over time. In the meantime, developing interventions that avoid triggering masculinity concerns could be useful. One example might be testing "plant-based" labeling as opposed to "vegan" labeling, since veganism is associated with lower perceptions of masculinity (Thomas, 2016).

Barriers and Motivators: Conclusion

Imperative to the promotion of plant-based meat is first remedying the barriers to reducing meat consumption and capitalizing on consumers' motivators to reduce consumption. Overall, the greatest barriers are as follows:

- enjoyment of eating conventional meat
- health concerns (particularly regarding lack of protein)
- lack of familiarity with alternatives to conventional meat and their preparation
- fear of new foods
- general unwillingness to alter current eating patterns

These barriers differ in strength by demographics and existing eating patterns. Because barriers to reduction tend to be more salient than perceived benefits, these barriers should be addressed through product development and subsequent messaging. For example, to address the barrier of enjoyment of eating conventional meat, plant-based product companies should continue to highlight the likeness of their products to conventional meat, as well as the enjoyable experience of consuming them.

Plant-based product development and marketing should also utilize the perceived benefits of meat reduction, although this should be based on a product's target market. For instance, traditional meat consumers are primarily driven to reduce consumption for health and lower costs, and flexitarians (meat reducers) are primarily driven by health, environmental impact, and animal welfare. Vegetarians and vegans are primarily motivated by animal welfare and health. Plant-based meat companies should seek to match their product development and marketing efforts with these evidence-based findings (see working papers 3 and 5).

Conclusion

Numerous drivers and barriers to meat reduction exist and are important to note when promoting plant-based meat to consumers. Many consumers care about health, the environment, and animal welfare, and these are significant evolving drivers to change dietary patterns. However, before these aspirational food-choice motivations are considered, the majority of consumers must feel that a product or dietary choice meets their needs in terms of taste, cost, and convenience, which are the foundational factors in food choice. Familiarity is an important driver that facilitates openness to trying new food.

Other barriers to reducing meat consumption identified in the literature include lack of convenience (e.g., preparing, purchasing, fitting in socially), enjoying the taste and experience of conventional meat, food

neophobia, meat attachment, and meat-related beliefs about masculinity. Reducing these barriers would probably play a significant role in increasing adoption of plant-based meat among consumers.

Not only must a product meet consumers' expectations for taste, cost, and convenience, but many barriers must be addressed. First, inconvenience and lack of familiarity both act as barriers to reduction, as many consumers (1) find it more difficult to prepare plant-based food, and (2) prefer to eat foods that are already familiar to them. A strong, overarching barrier is the perception that conventional meat is pleasurable, enjoyable, and linked to masculinity. Traditional meat consumers hold a strong attachment to its taste, as well as a strong overall emotional and normative attachment to conventional meat in general. Lastly, nutritional beliefs are both a driver and a barrier to reduced consumption. Meat consumption itself is perceived as healthy, in that it provides protein and nutrients. But on the other hand, it is perceived as causing health problems, which drives some consumers to reduce consumption.

Product development and marketing efforts may be guided by a comprehensive and evidence-based understanding of consumer food-choice motivations. This working paper provides an understanding of the foundational drivers of food choice, the evolving drivers of food choice, and the drivers and barriers to meat reduction. Importantly, the relative importance of each food-choice motivation varies by consumer group. Working Paper 2, *Consumer Segmentation*, delineates the research on consumer segmentation and the plant-based meat adoption process.

CHAPTER 02: Consumer Segmentation

Key Findings and Recommendations

- Because different groups of consumers are at different places in the plant-based meat adoption process, consumer segmentation is an important practice when promoting adoption of plant-based meat. Good consumer segmentation enables product developers and marketers to most effectively develop their products and target their messaging.

- In terms of plant-based meat consumption, consumers can be categorized using multiple theoretical frameworks. We recommend segmentation by the adopter categories of Rogers's Diffusion of Innovations Theory (innovators, early adopters, early majority, late majority, and laggards). Comprehensive profiles of early adopter and early majority groups would be especially helpful for marketers in targeting these groups most open to change.

- While numerous segmentation strategies exist, it is most practical to separate a population by its current rate of meat consumption in order to most effectively target for plant-based meat adoption. This strategy results in three primary consumer categories: vegetarians and vegans, meat reducers, and traditional meat consumers. However, each primary category can be further segmented on the basis of attitudes, behaviors, motivations, and demographics. For example, the meat reducer segment can be further segmented by type(s) of meat reduced and to what extent.

- Targeting the meat reducer segment (i.e., "flexitarians") will be the most effective use of resources because this group is already open to changing its behavior. However, marketers should be sure that messages targeting this group do not create negative reactance among the larger traditional meat consumer segment. Flexitarians' adoption of plant-based meat would lead the way for greater societal adoption of it.

- Effective product development strategies (discussed further in Working Paper 3) involve appealing to the largest portions of the population: traditional meat consumers and flexitarians. By developing plant-based meat products that are delicious, easy to prepare, familiar, and without cost barriers companies can increase the likelihood that traditional meat consumers will adopt these products.

- Choice-architecture influence strategies (discussed further in Working Paper 4) will primarily target meat reducers, who are most open to change and have already consciously made the decision to consume less conventional meat. Implementing strategic menu design and other nudge strategies will make it easier for meat reducers to choose to purchase plant-based meat.

- Promising messaging routes (discussed further in Working Paper 5) aimed toward meat reducers include taste and sensory appeal, meal context, convenience and familiarity, health, food safety, novelty, and altruistic benefits.

Introduction

The first working paper in this series on plant-based meat consumer adoption focuses on consumer motivations for protein consumption decisions. This second working paper focuses on consumer segmentation of plant-based meat adoption and aims to examine research related to two broad questions. First, how does a particular innovation, such as plant-based meat, become increasingly adopted throughout society? Second, how should marketers segment a population of potential consumers to accelerate this adoption?

This paper's two sections will address these questions. The first section delineates two segmentation theories: Diffusion of Innovations and Stages of Change. The second section reviews the different consumer segmentation strategies with respect to plant-based meat. When applied appropriately, these approaches can increase the effectiveness of targeted product messages. Working papers 3–5 provide more detail about strategies to influence consumers toward adoption, with a focus on flexitarians.

Segmentation Theories

Diffusion of Innovations

The Diffusion of Innovations Theory (DOI) was originally developed by E.M. Rogers in 1962 to explain how the adoption of new ideas, products, or behaviors spreads throughout a population over time through communication (Rogers, 2003). The main premise of DOI is that some people within a social system are more willing to adopt or consider a particular change than are others. By understanding the differences among these groups, marketers can more effectively tailor promotional messages, as well as integrate communication tactics to best influence all individuals in the social environment to "get on board." In other words, marketers can strategically emphasize different product characteristics to different groups of people. Consequently, they should prioritize reaching the most-willing groups first and then, systematically, focus on groups that are successively more difficult to influence.

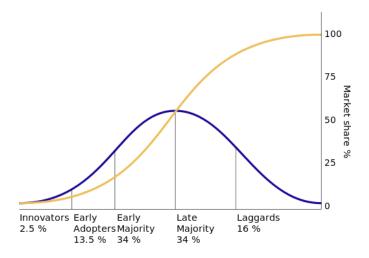*Figure 1*. Adopter categorization on the basis of innovativeness. Source: Wikimedia Commons. Based on Rogers, E. (1962). Diffusion of innovations. London, NY: Free Press.

The below section describes these five categories of people in accordance with Rogers's DOI. Figure 1 shows the (blue) bell curve of the distribution of a population across adopter categories. The number of individuals within

each category is typically observed across various (successful) innovation contexts. In fact, market research indicates that plant-based meat is successfully diffusing throughout society in its growth. In the International Food Information Council's (2019) health and food survey, 34% of participants reported eating plant-based protein daily, and almost a quarter of participants reported eating more plant-based protein than a year prior. Additionally, from 2017 to 2018, plant-based meat sales in the U.S. increased 23% (Bushnell, 2018). Due to the growing popularity of plant-based meat and plant-based protein, we can probably expect the same distribution of categories in the context of plant-based meat consumption. The (yellow) S curve shows the increasing market share as successive groups of consumers adopt the innovation and eventually saturate the market.

Rogers identifies five distinct categories of people. "Innovators" are the first to try a new behavior, product, or idea (and may even be its creators, as the name implies) and compose only about 2.5% of the population. Indeed, individuals in this group demonstrate enthusiasm for an innovation, and their top value can be identified as "venturesomeness" (Rogers, 2003, p. 283). Temperamentally, they often have an appetite for the risky and novel. These very qualities may be part of innovation's attraction for them. This desire for novelty, however, can be context-specific in that individuals may seek out novelty for only certain types of products.

Innovators are critical lead users of a new innovation. However, innovators may not be very integrated or powerful within a social system. Generally speaking, marketers can influence them to try the innovation and sustain their engagement with it relatively easily. Typically, all that is necessary to influence this group to try it is to raise their awareness of the innovation. Many vegans and vegetarians, or "heavy users" of plant-based meat products, probably belong in this category.

The next group, "early adopters," are comfortable with innovations and cognizant that change is often inevitable. They compose 13.5% of the population. As an integral part of their social systems, they may be "thought leaders" or "opinion leaders" in their local communities or social circles to whom others (who are considering an innovation) will turn for approval (Rogers, 2003).

As such, these individuals act as key assets to the innovation's dissemination. Rather than trying to convince this group to adopt the innovation, marketers should show them how to implement it. This effort will be made easier if the innovation is fairly easy to understand. Perceived complexity can be a significant stumbling block for all groups, including the early adopters. Along these lines, plant-based meat marketers can highlight the easy and quick preparation of plant-based meat, as well as its widespread, convenient retail locations (if applicable). Additionally, describing the function of plant-based meat as similar (or identical) to that of conventional meat will render the product easier to understand.

Third, the "early majority"—who make up about a third of all individuals in a system—need to see evidence of the innovation's worth prior to their adoption of it. The early majority members take their time deliberating whether to adopt a change. Often, this segment will be influenced simply by observing early adopters around them using the new innovation. Conversion stories (i.e., showing that a skeptic changed their mind about an innovation after engaging with it) are particularly persuasive to this group, as is evidence demonstrating that the innovation offers clear advantages over the status quo. Rogers calls this a "relative advantage." Conversion stories that identify plant-based meat's relative advantage may be those related to delicious product taste, convenience, low cost, weight loss, or better overall health. Moreover, the opportunity to try the innovation before committing to it is important to the early majority. The reluctance to be "locked in" to an option can dampen initial adoption.

The fourth group, or the "late majority," are skeptical and more reluctant to embrace change yet also make up another third of the population. The late majority ends up adopting the innovation only once it has become the norm and they feel social pressure (or the financial need) to adopt it (Rogers, 2003, p. 284). They may consider

adoption, but only after adoption by the early majority. For this reason, it is important that the product be observable, in that it should *show* results to those who are considering adopting it (as well as to those who have already adopted it). As it relates to plant-based meat, this feature may be of particular concern. The environmental devastation, animal suffering, and damage to one's health *that are prevented* by abstaining from purchasing conventional meat (and by purchasing plant-based meat instead) are not visible benefits of the product. Marketers should focus on what can be immediately observed, such as taste, social acceptance, ease of preparation, and weight loss.

Lastly, "laggards" are bound by tradition and suspicion, and fervently dislike change. They compose 16% of the population. Often, laggards are limited by their lack of resources, and their social networks are limited to other laggards (Rogers, 2003, p. 285). In order to reach the laggard group, marketers should emphasize that the innovation aligns with the group's values and experiences, or develop "compatibility" between the consumer and the innovation. Given this group's relative intransigence, marketers may need to utilize a "kitchen-sink" approach in order to influence this group (i.e., combining an assortment of behavioral techniques simultaneously to maximize effect). Alternatively, marketing to this group may not be a wise use of resources, and thus, marketers should consider not trying to influence them at all. As plant-based meat consumption becomes more widespread and plant-based meat becomes more visible in grocery stores and more frequently discussed in social circles, the laggard group will eventually begin to consume the product even without marketing efforts focused on them.

To date, we are aware of only one study (forthcoming; Szejda & Urbanovich, 2019) that has focused on segmenting consumers by their diffusion-of-innovations category. This study focused on the attitudinal and sociodemographic profiles of early adopters. Comprehensive profiles of early adopter and early majority groups would be especially helpful for marketers in targeting these groups most open to change.

Stages of Change

Prochaska and DiClemente (1983) describe a similar schema with their Stages of Change Model, also called the Transtheoretical Model. While the Diffusion of Innovations Theory focuses on characteristics of particular groups of people in a population, the Stages of Change Model focuses on the individual process a person undergoes when developing a new behavior.

Initially, people are in the precontemplation stage and have no awareness of a product, behavior, or innovation. It is once individuals reach the second stage (referred to as the contemplation stage) that they begin to consider adopting the product, behavior, or innovation. Next, individuals move to the preparation stage when they actively plan to adopt the innovation. They enter the action stage when they actually adopt the innovation, and the subsequent maintenance stage occurs when the adoption has become the individuals' new normal. Due to the resistance to change found in the heavy meat consumer (precontemplation) group, those in contemplation and action groups must be targeted first, as they may align with the flexitarian mindset and be open to change (explained below).

Precontemplation	No intention to engage in behavior in next six months
Contemplation	Intention to engage in behavior in next six months
Preparation	Steps taken to engage in behavior in next month
Action	Behavior changed within past six months
Maintenance	Behavior maintained for more than six months

The Stages of Change Model was originally developed as a framework for the internal processes undergone by individuals quitting smoking. Then, in 1999, Kristal et al. conducted a scoping review of dietary change studies guided by the Transtheoretical Model. The authors conclude that when the Transtheoretical Model is used in the context of dietary change, stages should be determined by self-rated dietary adherence rather than actual behavior. Internal engagement with the overall transition process should be measured for the purpose of understanding an individual's readiness to change. This approach will provide the most accurate understanding of an individual's current stage of change. Additionally, Kristal et al. (1999) remind us that the action and maintenance stages overlap for quite some time in dietary change and that this is normal. Individuals at this point are trying new dietary behaviors and choosing whether to implement them as part of their routine (i.e., maintenance). In our context, this might mean that individuals in the action stage are trying various types of plant-based meat while routinely consuming their favorite products.

The stages of change framework has been used to better understand a certain population's status in terms of meat reduction and adoption of a plant-based diet. For instance, in the context of meat reduction, Klöckner (2017) identified that of two Norwegian samples (N = 746 and N = 2,967), 72%–77% of participants were in the precontemplation stage, 3%–5% were in the contemplation stage, 7% were in the action stage, and 13%–15% were in the maintenance stage. This segmentation was based on reported weekly meat consumption in conjunction with behavioral intention measures. Additionally, in a sample of 415 Australian adults, Lea, Crawford, and Worsley (2006) found that, in terms of adopting a plant-based diet, over 58% were in the precontemplation stage, 14% were in the contemplation stage, 2% were in the action stage, and 27% were in the maintenance stage. These segments were measured with four yes-or-no questions (e.g., "Are you thinking about eating a plant-based diet in the future?"). Although these results are specific to the tested population and aren't explicitly focused on plant-based meat, they shed light on the potential difference in change patterns across countries and populations.

Only one known study has employed the Stages of Change Model to segment by consumption of plant-based meat. Hoek et al. (2011a) utilized the five stages to describe where a sample of 553 consumers in the U.K. and Netherlands were in their journey to adoption of plant-based meat consumption: About 57% of people were found to be in the precontemplation stage, while about 38% were in the contemplation stage and 3% in the preparation stage. The percentage of people in the last two stages (action and maintenance) was very small (Hoek et al., 2011a). Again, although insightful, this study does not provide representative information on the current stages of change distribution in the U.S. and other countries.

Market research points to a rapidly growing plant-based meat sector, with dollar sales growing 23% in the past year (The Good Food Institute, 2018). While previous stages of change research has found a large precontemplation stage with very few consumers in subsequent stages, the market has shifted significantly in

recent years, with new, innovative, and tasty plant-based meats entering the market. As with the findings of other research on plant-based products, consumer perceptions and action stages are probably in the same rapid change as the market itself. There is a strong need for more up-to-date consumer research on this topic so that marketers can effectively target consumer segments.

Segmentation Studies

These two theories help conceptualize how plant-based meat will become increasingly adopted in society. However, it is useful to make more concrete our understanding of these theories by applying each theory to a segmentation analysis of a population. For example, knowing that 3% of the population is in the preparation stage is helpful, but deeper data, such as this segment's characteristics and perceptions of conventional meat and plant-based meat, would prove more helpful in deploying tactics to promote plant-based meat. In fact, Vainio, Irz, and Hartikainen (2018) conducted a study to test the effectiveness of five different claims that promoted plant-based meat. Their findings revealed the importance of targeting messages on the basis of beliefs and attitudes. In their study, each message was effective in increasing intention to reduce meat consumption (and increasing consumption of plant-based protein) only when prior beliefs about conventional meat were taken into account (see Working Paper 5 for full review). All in all, the success of any adoption promotion strategy depends on appropriate segmentation and targeting.

There are many ways to segment a population. Graça (2016) reviews different factors that shape meat consumption and the substitution of plant-based foods, including macro-level and micro-level characteristics. Macro-level factors include certain cultural characteristics and urbanization levels, while micro-level factors include an individual's "meat attachment" and degree of agreement with prevailing cultural norms regarding meat. Below we review various segmentation studies that relate to food choice, including segmentation by values, by emotional connection to conventional meat, by demographics, and by current eating behavior.

Segmenting by Values

Many studies on consumer segmentation utilize survey (e.g., self-report) data. Due to this method, results may be misleading, as people may report more aspirational motivations regarding their purchasing interest in sustainable or healthy food. However, Sarti, Darnall, and Testa (2018) conducted a U.S. consumer segmentation study based on actual purchase data rather than self-report data to identify consumer segments. Specifically, the authors analyzed more than 370,000 purchases, including purchases of sustainability- and health-related products. The researchers found that three groups emerged based on purchasing ratios between purchasing categories (e.g., ecological-labeled non-food products, social-equity-labeled foods, health-labeled foods, organic-labeled foods, and vegan-labeled foods). "Collectivists" composed about 7% of the examined population and disproportionately purchased products that were socially beneficial. "Individualists" composed 22% of the sample and tended to purchase products that were more personally and less socially beneficial. Finally, "indifferents" composed 71% and were less easily categorized into one of the two other groups. They purchased sustainability- or health-related products, although not as often as either the individualists or the collectivists. The collectivists' purchases of ecological, socially equitable, healthy, organic, or vegan foods made up an average of 27.4% of their total purchases (compared with 10.44% of the individualists' and 3.6% of the indifferents'). Education level positively correlated with both collectivists and indifferents but not with individualists, meaning that the more educated, the more likely to fall into the collectivist or indifferent category. Overall, the results from Sarti et al. (2018) highlight that while values increase the likelihood of making values-focused purchases, they do not guarantee them. Even the collectivists, who made the most socially beneficial product purchases, made purchases that were values-focused less than half the time. As identified in Working Paper 1, it is generally necessary to meet the foundational drivers of taste, price, and convenience before evolving drivers, such as the

values explored here, have a chance to impact purchase decisions.

Sanchez-Sabaté and Sabaté (2019) conducted a scoping review of 34 articles focused on consumer behavior relating to meat consumption and environmental attitudes. On the basis of these articles, the authors identified the demographic traits of individuals who are most likely to reduce their conventional meat consumption for environmental reasons. These consumers were more likely to be younger and female and to value ecology, and they were more likely to live in Europe and Asia than in the U.S. Although the number of environmentally motivated consumers who expressed a willingness to reduce their meat consumption constitutes a small portion of the population (5%–18%), this overall trend provides insight into target audience for marketers utilizing environmental appeals.

In an experiment, Apostolidis and McLeay (2016b) asked 247 U.K. participants to choose a hypothetical ground meat product that was made from either a type of conventional meat (e.g., pork, beef) or a type of plant-based meat (e.g., soy protein). Attributes such as brand, price, environmental impact, and fat content were manipulated in the experiment to segment consumers by the primary drivers of their product choices. On the basis of their responses, participants were categorized into six groups: price conscious (42.5%), green (17%), taste-driven (14.6%), healthy (10.5%), organic (9.7%), or vegetarian (5.7%). Note that taste-driven consumers were identified by their disregard for fat content or other health information, strong preference for type of meat, and preference for butcher's meat rather than grocery store meat. Apostolidis and McLeay (2016b) then analyzed participants according to demographic composition. For example, "green" individuals were predominantly females aged 18–34, while "health-driven" individuals tended to be females over 55. The study showed that certain motivations underlying food choice were widespread across the population. For example, the consumers who were most concerned with carbon footprint labels and a product's country of origin (i.e., the "green" segment) were evenly split: Half were traditional meat consumers, and half were meat reducers. About three-quarters of the primarily health-driven consumers were meat eaters, and one-quarter were meat reducers. Additionally, price was a predominant factor for nearly half the sample. However, other motivations (e.g., environment, taste, health) were more segment-specific. This study demonstrates the complexity of meat-consumption choices and the utility of concise consumer segmentation by demographic, attitudes, values, and dietary factors. Such segmentation will allow marketers and product developers to make targeted formulation, labeling, branding, and messaging choices.

Verain et al. (2012) reviewed several studies on consumer segmentation related to sustainable food choices. They found that the most commonly identified segments could be grouped into three segments if grouped by values: "green," "potential green," and "non-green." The first group were the main purchasers of eco-friendly or organic products and valued health. The second valued fun, belonging, and health (to a lesser degree than the green segment). They had positive attitudes toward environmental products and intended to purchase them but had little knowledge of and were generally somewhat skeptical of environmental issues. The last group, the "non-green" segment, had the most negative attitudes toward and least knowledge of environmental issues, as well as reported values of conservatism and self-enhancement. Additionally, they were unconcerned with GMOs or artificial ingredients. Overall, the authors encouraged future segmentation studies to take into account behavior and lifestyle choices in addition to demographic variables. Demographic, attitudinal, and behavioral characteristics should all be considerations for future research studies aiming to segment consumers in the context of plant-based meat adoption. By determining a concise consumer segment to target, marketers and product developers can more readily satisfy consumer preferences such as flavor, price point, preparation, and distribution channels.

Segmenting by Emotional Connection to Meat

Graça et al. (2015b) identified three consumer profiles based on emotional connection with conventional meat. In this study conducted in Portugal, 49% of respondents demonstrated a positively valenced and highly emotional "attachment" to meat, while 37% demonstrated a negatively valenced and less emotional "avoidance" of meat. Lastly, 14% demonstrated a negatively valenced and highly emotional "disgust." Unsurprisingly, these classifications linked to one's willingness to modify dietary habits. Those in the "attachment" segment felt deprived when asked to consider abstaining from meat, were resistant to this change, and rationalized this resistance in different ways. Those in the "avoidance" category were more willing to change, especially if persuaded on the basis of health or animal welfare concerns. Finally, those in the "disgust" category did not eat much conventional meat (if any) to begin with.

It's important to note a limitation of the study: that the sample was not representative of the general population in Portugal. The majority of respondents were female, under 40, and urban; 13.7% identified as vegetarian or vegan; and 13.5% reported regular consumption of plant-based meat products. This unrepresentative sample may have skewed the number of participants within each consumer profile. However, it is important to note that the three consumer categories (attachment, avoidance, and disgust) are replicable and distinct "patterns of response," irrespective of the number of participants in each category. A useful next step would be to test the meat attachment constructs within representative samples (Graça et al., 2015b, p. 88). Previous studies, however, have identified that disgust response to and dissociation from meat will vary by culture and country (Kunst & Palacios Haugestad, 2018).

Segmenting by Demographics

Researchers have also segmented consumers by demographics. We should note, however, that many of the reviewed demographic segmentation studies are outdated, and consumer awareness of conventional meat's negative impacts and resulting motivations have shifted over time.

Lea and Worsley (2001) surveyed roughly 700 Australians and analyzed their beliefs about meat consumption by demographic information. They found that young and middle-aged people "perceived lack of iron and protein in vegetarian diets" (p. 132) and that older people believed that meat was necessary for good health and that meat "does not cause disease and is not fattening" (p. 134). The authors also investigated the predictors of meat consumption. For young people, the best predictor was the degree to which they thought meat was tasty. For middle-aged and older people, the best predictor was the belief that meat was necessary for one's nutrition. For all ages, health concerns were a significant predictor of meat consumption, although younger groups were more concerned with a lack of nutrients (e.g., iron, protein) in the vegetarian diet, while older groups overall believed that meat was healthy and a necessary dietary component for health. Due to the differing motivations and barriers, the authors suggest that messages be targeted to different age and gender groups (e.g., the authors suggest that, if targeting women, health-focused messages should emphasize delicious taste and optimized nutritional content).

Bryant et al. (2019) studied predictors of interest in buying plant-based meat across China, India, and the U.S. Overall, interest in plant-based meat was found not to be a niche interest, but rather fairly spread across demographic characteristics. Still, some patterns emerged. In the U.S., the more liberal one politically identified, the more they intended to purchase plant-based meat. Females were more likely to purchase plant-based meat in China, while in India, education, political identification, and income level predicted intention to purchase plant-based meat. Results from Bryant et al. (2019) directly highlight general population interest, as well as the

predictive ability of demographics in marketing plant-based meat.

Along similar lines, Hoek, Luning, Stafleu, and De Graaf (2004) found that vegetarians in their Dutch sample of 4,415 were predominantly women (73%), tended to live in urban areas, had more educational credentials, and earned a higher income. In the same sample, non-vegetarian consumers of plant-based meat were similar in demographics to the vegetarian portion, although their food attitudes and lifestyles more closely resembled those of non-consumers of plant-based meat. These findings emphasize that food choices may be aligned with an individual's sociodemographic status. Thus, targeting by demographics might increase the likelihood of influencing a segment that may be more open to plant-based meat.

In their study of 2,518 U.S. participants, Parry and Mitchell (2019) measured consumers' intent to purchase plant-based meat based on variations in product-label language, specific product attributes, and overall package appeal. Reported purchase intent varied across generations (millennials, Generation X, and baby boomers) and diet (omnivores and flexitarians). While the specifics of these findings are delineated in other working papers (working papers 3, 4, and 5), these differences emphasize the usefulness and importance of segmenting by demographics (specifically, age and diet), as beliefs, preferences, and attitudes vary across age groups (Parry & Mitchell, 2019).

Research studies such as these provide deeper insight into potential target audiences. Because demographic information provides representative data of an interested population, they also provide direction for tailored messaging strategies (see Working Paper 5) and product development ideas (see Working Paper 3). While there is sure to be variance within demographic segments, by researching, separating, and targeting population members with demographic information, marketers can discern more appropriate (and thus more effective) product development and messaging strategies. This information also increases the likelihood of influencing a consumer segment that is most open to trying plant-based meat. However, demographic segmentation is likely to be effective only to an extent, in that current behavior plays a key role in openness to plant-based messages and products, described below.

Segmenting by Diet

Another common method for segmenting consumer adoption of plant-based meat is asking about current dietary patterns. De Boer, Schösler, and Aiking (2017) surveyed 350 young Dutch participants face to face. The authors classified participants into four segments according to number of days per week on which they consumed conventional meat combined with their average meat portion size: vegetarians (6%), low-meat consumers (24%), medium-meat consumers (37%), or high-meat consumers (33%). While vegetarians did not consume meat, low-, medium-, and high-meat consumers on average ate meat 2.5, 4.4, and 5.8 days per week, respectively. The authors then analyzed participants' stated relationship with meat. Those in the low and medium groups justified eating meat for health reasons and for food variety. Those in the high group most reported having a daily routine in which meat consumption fit well, underscoring the varying motivations for meat consumption and their correlation with amount of meat consumed. The authors' method of asking about "amount of meat per day" (rather than per meal) was culturally appropriate, in that Dutch people typically have only one main meal in which conventional meat is usually included. Segmentation studies should adjust their consumption measurement to be appropriate in a specific cultural context. For instance, in the U.S., measuring meat consumption would be more appropriate by meal rather than by day.

Neff et al. (2018) conducted a nationally representative survey of meat reduction behaviors in the U.S. While two-thirds of their sample reported reducing their consumption of some category of conventional meat, only 10% of those reducers had decreased consumption of all four categories (poultry, seafood, red meat, and processed

meat). The participants could be further segmented by types of meat reduced. Twenty-one percent reduced their poultry intake, and 26% reduced their seafood consumption. Additionally, 55% of the reducer sample decreased both red and processed meat consumption, and of these reducers, 37% increased either seafood or poultry intake (Neff et al., 2018). Overall, this study highlights the complexities within the meat reducer segment and how simply segmenting by overall amount of conventional meat consumed (or reduced) may not include subsections of the reducer segment.

In their study that examined motivations to consume plant-based meat, Hoek et al. (2011b) segmented their sample by level of plant-based meat consumption. This segmentation strategy resulted in 324 non-users of plant-based meat, 133 light/medium users (who consumed plant-based meat less than one time per week), and 96 heavy users (who consumed plant-based meat one or more times per week). Non-users scored highly in terms of fearing new foods, while heavy users were motivated to consume ethical foods. Both non-users and light/medium users were not as motivated ethically as the heavy users.

As referenced previously, Hoek et al. (2011a) also segmented their U.K. and Dutch sample of 553 participants by the five stages of change. About 57% of people were found to be in the precontemplation stage, meaning that they were not yet consuming plant-based meat. Thirty-eight percent were considering eating plant-based meat, while 3% were beginning to consume it. The percentage of people who were already regularly consuming plant-based meat was very small (Hoek et al., 2011a).

Consumers can be segmented by amount of conventional meat currently consumed, meat reduction, and dietary identity, each with differing outcomes. In their study of consumer intent to purchase plant-based products, Parry and Mitchell (2019) also found variation in responses based on whether an individual identified as a meat reducer or as a traditional meat consumer, which was measured through self-reported dietary identity. It should be noted, however, that these self-reported dietary identities may not capture the true number of individuals within each group. Bryant, Szejda, Parekh, Deshpande, and Tse (2019) found that more individuals reported reducing their meat consumption than reported identifying as flexitarian.

Current dietary choices probably provide the most accurate prediction of one's willingness to consume plant-based meat. As the above studies reference, only a small number of people currently regularly consume plant-based meat, while the majority of people do not even consider it. This leaves the meat-reducing segment (or "flexitarians"), who are most open to trying plant-based meat, although meat reduction choices vary widely across this consumer group (Neff et al., 2018). The next section details three preferred segmented groups and provides recommendations for segmentation strategies.

Preferred Segmentation Approach

As the previous section suggests, there are many ways to segment a population with regard to adoption of plant-based meat. Targeted messaging will be most effective when multiple factors (e.g., demographics, attitudes, emotions, values, diet) are taken into account. Therefore, using the Diffusion of Innovations framework to develop comprehensive profiles of early adopter and early majority groups would be especially helpful for marketers in targeting these groups most open to change.

In the absence of comprehensive segmentation based on early adopter and early majority groups, we recommend using dietary habits as the primary means of segmentation. Importantly, status as a meat reducer predicts intention to consume plant-based meat (Szejda, 2019). Therefore, developing profiles on the basis of identification as a meat reducer will also be useful for marketing. Briefly, we describe the three

groups—vegetarians and vegans, traditional meat consumers, and flexitarians—and then provide strategy recommendations for engaging with each group. More detail on these suggested strategies will follow in the remaining working papers of this series.

In conjunction with the above-referenced segmentation literature, we must now determine the best consumer segment to target. We identified three primary consumer segments throughout the literature, as shown in the table below.

	Diet Segment		
	Traditional Meat Consumers	**Meat Reducers or Flexitarians**	**Vegetarians and Vegans**
Definition	• Largest consumer segment • "Late adopters" or "laggards" in consuming plant-based meat • Consumers most likely to resist change, especially when foundational food-choice needs are not fully met (see Working Paper 1)	• "Early adopters" with greater willingness to change • Typically about 13.5% of the population	• Smallest consumer segment • "Maintenance stage" consumers • Consumers who have already changed their behavior
Similar Segments by Study	• "Price-conscious" and "taste-driven" in Apostolidis and McLeay (2016b) • "Meat attached" in Graça et al. (2015b) • "Non-green" in Verain et al. (2012)	• "Potential green" in Verain et al. (2012) • "Meat avoidant" in Graça et al. (2015b) • "Healthy," "organic," and "green" in Apostolidis and McLeay (2016b)	• "Disgust" in Graça et al. (2015b) • "Green" in Verain et al. (2012) • "Collectivist" in Sarti et al. (2018) • "Vegetarian" in Apostolidis and McLeay (2016b)

Traditional Meat Consumers

As the largest consumer segment, traditional meat consumers are typically driven by price and taste and have an affective connection to conventional meat (Apostolidis & McLeay, 2016b; Graça et al., 2015a, 2015b; Lea & Worsley, 2001). Apostolidis and McLeay (2016a) found in their interview study that this consumer group was mainly motivated to purchase plant-based meat because of its health benefits related to weight loss (low in fat and calories) and its versatility (i.e., its ability to fit well as an ingredient in popular recipes or current favorite

meals). Currently, these consumers probably compose the early majority, late majority, and laggards categories in reference to the adoption of plant-based meat consumption. They are resistant to change and, if pressed to limit their consumption, have a set of rationalizations for not doing so, including the belief that eating conventional meat is necessary for health and that alternative dietary choices are simply unrealistic (Graça et al., 2015a). Moreover, other work has shown how messages that promote plant-based meat may risk triggering this segment's psychological defense mechanisms and fears that their personal freedoms are being threatened (Steindl, Jonas, Sittenthaler, Traut-Mattausch, & Greenberg, 2015; Lombardini & Lankoski, 2013; Ungar, Sieverding, Schweitzer, & Stadnitski, 2015). For these reasons, messages and interventions should be carefully designed and consider the potential for backlash.

Effective interventions might focus on choice-architecture-based approaches (see Working Paper 4) and the positive sensory properties of plant-based meat (e.g., taste; see Working Paper 3) rather than direct messaging (see Working Paper 5). For targeting traditional meat consumers, product improvement (e.g., lower price, better taste) is a promising strategy, but to influence behavior change fairly dramatic price and taste improvements may be needed.

Flexitarians

Flexitarians are more open to reducing their meat intake and are likely to be concerned with their health and the environment (Neff et al., 2018). In the context of the previous segmentation studies, they are "early adopters" (Rogers, 2003); "potential green" (Verain et al., 2012); "meat avoidant" (Graça et al., 2015a); and "healthy," "organic," and "green" (Apostolidis & McLeay, 2016b). Apostolidis and McLeay (2016b) found that this group was motivated to consume plant-based meat because of its health benefits (including weight loss), enjoyable experience, and versatility. Although meat reducers are more similar to traditional meat consumers than to vegetarians in their attitudes regarding animal welfare (De Backer & Hudders, 2015), they do acknowledge the negative effects on one's health, the environment, and animal welfare associated with eating conventional meat (Graça et al., 2015a). This highlights an overlap of values with vegetarians and vegans.

Since flexitarians are on the "margin" (i.e., potentially willing to change their diets), they represent a critical target for plant-based meat advocates. Their adoption of plant-based meat would lead the way for greater societal adoption of it. How do we achieve this outcome? Messages about great taste, low price point, and health benefits are more promising routes than messages about environmental impact and animal welfare. Furthermore, such appeals to taste and price will probably not lead to greater resistance to the product among traditional meat consumers. Finally, improving the product's taste and cost to meet the above claims will probably increase its adoption among flexitarians (and among traditional meat consumers, as noted).

In Szejda's (2019) plant-based meat descriptor study, 18% of participants self-identified as following a flexitarian diet ("I sometimes eat meat, but often choose plant-based foods instead"). A higher percentage reported dietary behaviors consistent with a flexitarian diet, with 32% of participants reporting that they rarely or sometimes ate meat and 30% reporting that they consumed slightly or a lot less meat compared to one year earlier. These findings within a representative sample of 1,167 U.S. adults show that nearly one-third of general-population members are potential early adopters of plant-based meat.

Flexitarians should be the key target demographic and can be further segmented and analyzed. In a national study, Neff et al. (2018) identified that about two-thirds of U.S. residents were reducing one or more types of conventional meat. Some flexitarians (10%) reduced their consumption of all conventional meat, including poultry, seafood, red meat, and processed meat, while a large majority (55%) reduced only red meat and processed meat (Neff et al., 2018). In fact, of those who reduced only red and processed meat, 37% (or 20% of

all red and processed meat reducers) increased either poultry or seafood intake. This finding reveals that those who reduce one or more types of conventional meat but increase consumption of another compose only about 13% of meat reducers. Overall, these findings highlight both the complexities of the flexitarian group's behaviors and the divisibility of the group into subsegments (i.e., types of conventional meat reduced).

Neff et al. (2018) also found that flexitarians tended to cite cost and health as the main reasons driving their reduction. They reported environmental and animal welfare reasons much less. Low-income individuals cited cost as a reason for reduction more often than high-income ones did, and high-income people cited health more often. Interestingly, though, the authors note the limitations of campaigns that emphasize these factors. For example, the cost of a product can decline over time, and populations can also become wealthier, thus rendering cost a less impactful factor. Nonetheless, the authors conclude their study by recommending that public officials emphasize health and environmental concerns in order to decrease meat consumption. Highlighting the health benefits and, to a lesser extent, the environmental benefits of eating less conventional meat is a feasible approach and immediately implementable. Essentially, these benefits are targeted to our key demographic because meat reducers are driven by these concerns.

Vegetarians and Vegans

Vegetarians and vegans are those in the "maintenance stage," and many probably already consume plant-based meat products. Vegetarians and vegans generally fall into Graça et al.'s (2015b) "disgust" segment and Verain et al.'s (2012) "green" segment. In the U.K., Apostolidis and McLeay (2016b) found that this group was motivated to consume plant-based meat because it is better for animal welfare, fits in well with their lifestyle, and is healthy (low in fat) and a pleasant experience. Since they already consume a meat-free diet, vegetarians and vegans are not the main target audience for increasing consumer adoption of plant-based meat. However, these individuals can contribute to the "normalization" of plant-based meat by visibly consuming the product. Furthermore, vegetarians and vegans can be encouraged to "stay on the wagon" and maintain their diets. Faunalytics (2014) examined common reasons that people stop following a vegetarian diet, and these included not feeling involved in a larger vegetarian community, not fitting in socially because of the diet, and not having a vegetarian identity. To correct these issues, marketers should consider messages that emphasize the consumption of vegetarian food as common, perhaps by utilizing "social norm" messages (see Working Paper 5).

Suggestions for Future Consumer Segmentation Research

Continued population segmentation research is necessary to appropriately target each aforementioned group. We recommend first developing comprehensive profiles of early adopters and early majority groups using the Diffusion of Innovations framework. Additionally, this area would benefit from a nationally representative survey that clearly measures and segments vegans, vegetarians, flexitarians, and traditional consumers. Previous studies have measured behavioral nuances of meat reducers (Neff et al., 2018), and national polls have surveyed approximate percentages of vegans and vegetarians (Gallup, 2018; Pew, 2016). However, to date, no national survey has measured dietary behavior or identity to clearly segment the population into these three dietary groups. Generating further understanding of the flexitarian group will help marketers appeal to their needs.

Another suggestion for future research might be to conduct attitudinal and demographic research on current consumers of plant-based meat or those who are open to trying it. By working backwards, researchers can glean a clearer picture of motivations for purchasing plant-based meat of those who do so and whether or how these motivations correlate with other segmentation factors (e.g., demographics). Such an approach will provide explicit guidance for marketers of plant-based meat in addressing specific segments by appealing to their current

attitudes.

Lastly, segmentation research should identify whether each of these groups holds different volume in different spaces. For instance, if 33% of the overall population identifies as meat reducers, what percentage of volume does this reducer group compose in the retail space and in restaurants? Understanding these potential differences will direct marketing foci of plant-based meat companies.

Conclusion

This paper provides an overview of (1) how an innovation such as plant-based meat might become increasingly adopted by a society, and (2) how to segment a consumer population to accelerate this process. The reviewed studies suggest that meat reducers are the most promising consumer segment to target. In the following papers, we will turn to several promising areas of research that can be applied to these consumer segments to impact the diffusion of plant-based meat as an innovation, including product development, choice architectural interventions, and messaging to particular consumer segments.

SECTION B:

Strategies to Increase the Rate of Market Adoption

CHAPTER 03: Product Attributes and Product Development

Key Findings and Recommendations

- The top motivations for food choice that should be considered in product development include taste and other sensory characteristics, price, convenience, familiarity or novelty, and health or nutritional profile.

- According to previous research, the perceived strengths of plant-based meat that product developers and marketers should leverage include health benefits, appropriateness within meal contexts, status as "new" and "exciting," and, to a lesser extent, low environmental impact and high animal welfare impact.

- Current reported consumer barriers to consumption of plant-based meat that product developers and marketers need to overcome include negative health beliefs, lack of familiarity with the product, perceived high cost, low sensory appeal, and inconvenience.

- Plant-based meat products should be developed to provide personal benefits to the flexitarian consumer, such as improved taste and other sensory aspects, lower product cost, increased product convenience, and improved healthiness of the product. The product should be exciting yet provide a strong sense of familiarity. Familiarity can be achieved through similarity to animal-based meat and ability to "fit" in appealing dishes and established meal contexts.

- Research identified in this paper shows that improved sensory experience is likely to be achieved by developing products that are closer to conventional meat in texture, juiciness, and appearance.

- Health beliefs act as both a barrier and a benefit to plant-based meat adoption. Generally, consumers perceive plant-based meat as healthy in terms of facilitating weight loss and being low in saturated fat but also express uncertainty in terms of sufficient protein or nutrient content and digestibility, especially in comparison with conventional meat.

- The fact that plant-based meat is "new" to many consumers is also both a benefit and a barrier. A portion of the population dislikes trying new foods, and thus, to access these individuals, marketers should frame plant-based meat as familiar (e.g., made with recognizable ingredients or made to be very similar to conventional meat). Another portion of the population perceives new foods as an enjoyable adventure. These individuals are therefore drawn to plant-based meat. If targeting these population members, marketers should highlight the product's status as new and exciting when framing it.

- New and appealing products have reached the marketplace in recent years. Most of the studies reviewed in this paper were conducted prior to 2016 and may not reflect consumer perceptions of these new products. Importantly, consumer perceptions of early plant-based meat products may persist, and thus, even current perceptions may be based on less appealing older products.

Part I: Product Attributes as Plant-Based Meat Drivers and Barriers

Introduction

This paper will review a body of research that examines consumer perceptions of plant-based meat's specific attributes, highlighting those that act as barriers to adoption and those that act as drivers.

When consumers want to reduce their meat consumption, they must figure out what to eat instead. High-fidelity plant-based meat offers a relatively easy path for substitution, preserving the broader meal context. Plant-based meat products fit in well in social situations (e.g., barbecues) in which others consume conventional meat, and they also maintain the convenience, preparation, and cultural practices associated with conventional meat. Moreover, according to findings from in-depth interviews with vegans and vegetarians, plant-based meat has afforded ease of eliminating conventional meat consumption. This is because the products allow them to retain commitment to meat reduction while "fitting in" at social gatherings (Nath & Prideaux, 2011).

However, taste and other sensory aspects of early plant-based meat products are not very similar to those of conventional meat and have low appeal among meat consumers. Taste is the most important factor in food choice and heavily influences dietary change. In an intervention focusing on weight loss, Lloyd, Paisley, and Mela (1995) identified taste (as reduced-fat products were not as tasty) as the primary barrier to dietary change. Other identified barriers to dietary change included increased cost, decreased convenience, lack of family support, and lack of self-efficacy in food preparation.

When the research reviewed in this summary was published, high-fidelity plant-based meats were not yet widely available. Therefore, the consumer-perceptions data reported on in this section do not fully pertain to the most recent plant-based meats. Nevertheless, these studies provide information about current consumer perceptions, as many consumers' assumptions about current products may be based on experiences with earlier products, as well as direction for future product development.

Previous chapters in this series focus on and identify the perceived benefits and barriers to meat reduction. Part A focuses on identification of drivers and barriers, specifically to plant-based meat adoption. Part B provides recommendations for improvement of plant-based meat products based on these research findings. If positive sensory appeal cannot be communicated and delivered, then the strongest attribute of plant-based meat is its health benefits. The most salient barriers are anticipated low sensory appeal and lack of consumer familiarity with the products.

Synthesis of Research Findings

Drivers - Product Attributes - Plant-Based Meat

The majority of desired attributes of plant-based meat are closely related to the drivers for reducing meat consumption discussed in previous papers in this series. For individuals who consume conventional meat at least occasionally, these attributes typically include health benefits, decreased environmental impact, and, to a lesser degree, increased animal welfare. Certain product attributes of plant-based meat act as both drivers and barriers to consumer adoption. For instance, health beliefs may act as drivers for choosing plant-based meat, but beliefs about the healthiness of conventional meat may prevent people from reducing meat consumption or eating plant-based meat. Also, novel aspects of plant-based meat motivate more adventurous eaters to try it, while

such novelty may act as a barrier for more food-neophobic people.

Personal Health Benefits

Although previous research indicates that many people believe conventional meat is a nutritious and necessary dietary component (highlighted further in Part B), studies also show that plant-based meat is perceived to provide numerous health benefits, including nutrition and weight control (Apostolidis & McLeay, 2016a; Elzerman et al., 2013; Hoek et al., 2011a). In this section, we will discuss how health beliefs act as drivers to plant-based meat consumption. Health beliefs that act as barriers will be discussed later. Both the driver and the barrier aspects should be considered in product development or marketing communication decisions.

Focus group discussions in the Netherlands by Elzerman et al. (2013) revealed that the nutritional content of plant-based meat as a food innovation is a saliently perceived benefit. Participants reported that the positive health aspects of plant-based meat (including high protein quantity and low saturated fat content) provide reason to try plant-based meat (Elzerman et al., 2013). Secondly, Elzerman et al. (2013) found that individuals may be wary of conventional meat due to "several food scandals, like the mad cow disease" (p. 704) and that this distrust may be a driver for increased consumption of plant-based meat. Moreover, participants perceived that plant-based meat may simply be better for one's health than conventional meat. Overall, various aspects of nutrition and disease prevention are reported benefits of plant-based meat consumption.

Consumers also perceive weight control to be a health benefit of plant-based meat. Hoek et al. (2011a) studied consumer motives for eating either plant-based or conventional meat in both the U.K. and the Netherlands. "Non-users" of plant-based meat (those who had never eaten it or had tried it only once) reported that plant-based meat was both an ethical choice and a means of weight control. Despite these beliefs, these benefits were not sufficient to drive purchasing behavior within this group. "Light/medium users" (those who ate plant-based meat 1–4 times per month) also reported the ethical and weight-control benefits, although they held these beliefs more strongly than the non-users did. Lastly, the third group (those who frequently consumed plant-based meat, primarily vegetarians) reported numerous health-related benefits of plant-based meat, including weight control, better health, elevated mood, and natural product content.

Moreover, participants in the focus group study conducted by Elzerman et al. (2013) reported that one of the many reasons to eat plant-based meat was that it was "part of a weight loss program" (p. 704). Together, these findings exemplify the perceived attribute of weight control as a key health benefit of eating plant-based meat, although this benefit may not sway non-user consumers to purchase plant-based meat products.

It should be noted, however, that in a study comparing values of non-vegetarian and vegetarian consumers of plant-based meat, non-vegetarians shared more food-related values with traditional meat consumers than with vegetarians, especially in regard to environmental and health drivers (Hoek et al., 2004). In other words, the fact that both groups consumed plant-based meat did not mean that they shared motivations for doing so. In fact, Hoek et al. (2004) found that both ethics and health claims were less effective for non-vegetarians who either did or did not consume plant-based meat in comparison with the vegetarian group. The authors therefore cautioned against adopting marketing efforts that rely solely on ethics or health claims to reach meat consumers.

Parry and Mitchell (2019) highlighted the importance of framing health attributes as gains rather than losses in a forced-choice experiment specific to plant-based meat. The 2,518 U.S. adult participants were exposed to two randomly presented product attributes (e.g., "indulgent" and "nutritious"). Participants were directed to choose which attribute they considered more important when purchasing plant-based meat products. Results indicated that taste, quality, and health were the three most important attributes. More specifically, the most preferred

health claims were "healthy positive" claims, framed as gains: Seventy-two percent of participants preferred products that were "healthy," 68% preferred "nutritious" and "high protein," and 61% preferred "high fiber." Ratings were lower for "healthy restrictive" claims, framed as a reduction or absence of something: Fifty-two percent of participants preferred products that were "unprocessed," "low in sugar," and "low in salt," while 49% preferred "low fat," 47% preferred "low calorie," and 26% preferred "egg-free."

Parry and Mitchell's (2019) findings on consumer preferences for plant-based protein sources are important to note for product development. While almost half (47%) of participants reported willingness to consume all types of plant proteins, other participants reported avoiding certain plant proteins at varying rates: soy protein (29%), fava bean protein (25%), pea protein (20%), chickpea protein (19%), lentil protein (18%), and wheat protein (18%). Flexitarian participants were less averse to untraditional plant proteins than traditional meat consumer participants, while Generation X participants were more averse to all plant proteins than both millennials and baby boomers.

Overall, these findings suggest that products should be developed to be high in protein content in accordance with consumer preferences (Elzerman et al., 2013; Hoek et al., 2011a). Messages about the health aspects of plant-based meat could be nuanced and outline nutritional aspects more specifically and cite health claims where appropriate.

Altruistic Benefits

Perceived altruistic benefits of plant-based meat include reduced environmental impact and improved animal welfare. Dutch participants in focus groups conducted by Elzerman et al. (2013) reported animal welfare as a reason to consume plant-based meat. Moreover, Apostolidis and McLeay (2016b) found in their choice experiment that consumer groups in the U.K. consistently cited social, environmental, and animal welfare benefits as desirable attributes of plant-based meat products. However, these ethical attributes had a much stronger influence on purchasing among the meat reducers compared with traditional meat consumers. Although plant-based meat offers additional altruistic benefits, such as improved global food security, these have not yet been adequately examined as potential motivations for food choice.

As noted above, results from a comparison of ethical values between Dutch vegetarians and Dutch meat consumers by Hoek et al. (2004) somewhat contradict the findings of Apostolidis and McLeay (2016b). Ethical and health claims were less effective for the two non-vegetarian groups in comparison with the vegetarian group, highlighting the inadequacy of ethics-focused messaging alone to target non-vegetarian groups. In sum, all consumers acknowledge plant-based meat's altruistic benefits to a degree, but the consumer segment determines their salience. The strength of health claims and ethical claims increases when the two are used together. However, as noted below and in Working Paper 1, consumers' greatest food-choice motivation is taste, and thus taste should be a primary product development and messaging strategy. Future research should examine whether ethical appeals as secondary messaging influence the effectiveness of health and taste claims and to what degree such influence might persist in each consumer segment.

Parry and Mitchell's (2019) study also examined whether the percentage of consumers intending to purchase a plant-based product increased as a result of the product's altruistic attributes. The altruistic attributes tested were "sustainable" (which over 50% of respondents reported as important), "environmentally friendly" (49%), "humane" (44%), and "ethical" (43%). Dietary habits played a small role in results. Overall, about 6 percent more flexitarian than traditional meat consumer participants reported intent to purchase environmentally friendly, humane, or ethical products. Reported purchase intent also varied by age. Millennials reported intent to purchase sustainable, environmentally friendly, and humane products more often than Generation X and baby boomers.

However, the same percentage of millennials and Generation X members (46%) reported purchase intent for "ethical" products compared with 39% of baby boomers. Overall, Parry and Mitchell's (2019) study underscores the relatively high interest in products with altruistic attributes as reported by 40%–50% of the general population, with more individuals interested in environmental attributes than in animal-welfare-related attributes. However, it should be noted that these overall altruistic attributes were at least 20% lower in perceived importance than those relating to taste, quality, health, and convenience.

Overall, these findings suggest that although altruistic benefits are important to consumers, foundational drivers and health drivers are more salient. Therefore, ethics-focused messaging alone will be insufficient to target non-vegetarian groups, and ethics should be explored as a "bonus" benefit to highlight when products meet foundational needs for food choice.

Opposing Forces: Desire for Novelty Foods vs. Desire for Familiar Foods

Like health beliefs, the novelty of plant-based meat may act as a double-edged sword. Some consumers find the novelty of plant-based meat appealing and thus an incentive to try it. At the same time, for other consumers, familiarity with such factors as flavor, appearance, and preparation are drivers of purchase intent. These opposing forces should be considered in developing and communicating about new products. In this section, we will address how both novelty and familiarity may act as drivers of interest for different consumer segments. In part B, we will discuss how lack of familiarity may act as a barrier.

In studies that examined meat consumers who occasionally consumed plant-based meat, one of the strongest drivers was a desire for variety and innovative, exciting new foods. For example, the Hoek et al. (2011a) study of U.K. and Dutch consumers found that an interest in trying new foods and increasing dietary variety was the primary driver for consumers who occasionally consumed plant-based meat. In this study, 40% of participants had relatively low neophobia scores. However, individual neophobia scores were all below 35 out of 70, even among the majority. The Apostolidis and McLeay (2016a) study found that this desire to try new and unconventional foods was also a reason to eat plant-based meat among traditional meat consumers in the U.K. In this study, traditional meat consumers rated Quorn (a popular brand of plant-based meat) as tasty but not familiar or conventional. Thus, plant-based meat may not need to perfectly replicate conventional meat to satisfy the demands of these consumers. Rather, innovative new products that have good sensory properties may appeal to those who are not neophobic (Apostolidis & McLeay, 2016a). To appeal to traditional meat consumers, one marketing approach may be to frame plant-based products as new, exciting, and appealing, whether or not they are perfect replicas of conventional meat.

However, the Dutch and U.K. surveys conducted by Hoek et al. (2011a) found that the strongest significant determinant of plant-based meat adoption was product familiarity, both for non-users and light/medium users of plant-based meat. Participants in Parry and Mitchell's (2019) choice experiment generally preferred a product that was perceived as familiar. Altogether, half or more of participants reported perceiving a product's status as "comfort food" (58%), "familiar" (49%), or "traditional" (57%) as important to their purchasing decisions. On average, about 6% more traditional meat consumers than flexitarians reported preferring these attributes. Preference for familiarity increased with age of generation in another portion of the experiment, where participants were asked to indicate whether they intended to purchase a plant-based product on the basis of a randomly presented product label. Interestingly, 75% of all participants reported that they would purchase a product with an "All-American" label, suggesting that this label indicates a key attribute of familiarity in both culture and production origin.

However, the study also showed that more than one-third of U.S. consumers were interested in novel products. Forty-three percent of participants reported that a plant-based product's status as "exciting" would increase their intent to purchase that product, while 44% reported the same for "interesting," 42% for "innovative," and 27% for "novel." These percentages were generally consistent across dietary choice and age group.

A study of consumers in the U.S., India, and China (N = 3,030) offers insight for product developers and marketers by providing a sense of the number of consumers who may resist adopting plant-based meat. The study found food neophobia to be a significant predictor of intention to purchase plant-based meat, suggesting that product developers and marketers should consider food neophobia when seeking to increase adoption of plant-based meat. Essentially, the lower one's food neophobia score, the more one intends to purchase plant-based meat (Bryant, Szejda, Parekh, Deshpande, & Tse, 2019). In this study, 23.8% of U.S. participants reported moderately high to high food neophobia, with 19.8% of Indian participants and 13.8% of Chinese participants reporting moderately high to high food neophobia (i.e., a mean neophobia score above three out of five).

With large numbers of consumers on both sides of the familiar-novel divide, product developers and marketers should seek to deeply understand their specific target customers and develop products and communication strategies tailored to their preferences.

Meal Context

One strength of plant-based meat is that it fits well in the entirety of a familiar meal. Elzerman et al. (2011) designed a consumer taste test of several plant-based meat products offered alone or as part of a dish. Participants reported liking the products more when they were part of a dish. Product form and type of dish also influenced product liking. For example, participants viewed spaghetti with ground plant-based meat as more appropriate than spaghetti with plant-based meat in more-solid forms. However, they ranked rice paired with more-solid forms as more appropriate than rice with ground meat. Overall, small pieces of plant-based meat, such as cutlets, were more acceptable than large pieces. In essence, plant-based meat is not simply a meat-like ingredient but an ingredient that consumers may view as appropriately fitting in a whole meal.

Apostolidis and McLeay (2016a) highlighted the pervasiveness of meal-context appropriateness as a social and cultural attribute that influences consumer purchasing decisions: Regular consumers of plant-based meat want to share plant-based meat products that are more meat-like with their social circles because the products easily fit in familiar meal contexts.

Barriers - Product Attributes - Plant-Based Meat

Saliently reported obstacles specific to plant-based meat's adoption are attributes such as low sensory appeal, high price, lack of convenience, health beliefs, and lack of familiarity.

Low Sensory Appeal

Among the product attributes that most significantly prevent consumer adoption of plant-based meat is low perceived sensory appeal, including taste and texture. Additionally, in a New Zealand survey of former vegetarians, the second-most-reported reason for returning to conventional meat was missing its taste (Barr & Chapman, 2002). A focus group study in New Zealand conducted by Tucker (2014) also concluded that, while consumers were aware of the environmental and financial benefits of reducing meat consumption, the sensory aspects of replacement foods were not satisfactory.

In a 2018 taste test, consumers were asked to rate the sensory properties of various plant-based chicken and plant-based beef burger products, as well as those of their animal-based counterparts (Precision Research, 2018). Omnivores rated plant-based chicken and burgers significantly lower than conventional meat products in terms of overall liking, appearance, and texture. Only one brand of plant-based burger scored similarly to the beef burger in sensory appeal. Complaints about the other plant-based burgers' sensory properties included too strong a flavor, insufficient juiciness, and unpleasant aftertaste. Consumers described plant-based chicken products as rubbery and insufficiently juicy with an unpleasant aftertaste. These results suggest that, even in recent years, few plant-based meat products have been sufficiently analogous to animal-based meat products with respect to sensory properties.

While many consumers want plant-based meat to mimic conventional meat in taste and texture, this finding is not consistent across all consumer segments. In their survey of U.K. and Dutch consumers, Hoek et al. (2011a) found an inverse relationship between frequency of plant-based meat analog consumption and desire for meat-like sensory properties. Consumers who never or rarely ate plant-based meat wanted its sensory properties to closely resemble those of conventional meat. On the other hand, consumers who heavily ate plant-based meat (mostly vegetarians) preferred that products be less similar to conventional meat in texture, smell, appearance, and taste (Hoek et al., 2011a). It is important to note that this research was conducted prior to the market arrival of high-fidelity plant-based meat products and that the market for consumers who heavily ate plant-based meat products was small.

In the Elzerman et al. (2013) focus groups, negative sensory components of plant-based meat included "uniform taste, soy flavor, compactness, dryness and softness" (p. 706). Apostolidis and McLeay (2016b) noted in their U.K. study that meat consumers and vegetarians reported differing perceptions of how "meat-like" Quorn (a meat substitute) was: Vegetarians perceived Quorn to taste meat-like, while traditional meat consumers reported that it tasted "unconventional" (p. 27). The authors surmise that vegetarians' enjoyment of the product is underscored by plant-based meat's ability to meet other needs, such as altruistic motivations and fitting in well socially (Apostolidis & McLeay, 2016b; Ruby & Heine, 2012).

In a taste experiment that examined consumer ratings among beef burgers, plant-based burgers, and insect burgers, Schouteten et al. (2016) found that plant-based burgers were consistently rated lower than beef and insect burgers by Belgian consumers. Notably, across three different experimental taste-test conditions (blind, informed, and expected), plant-based burgers ranked highest as "distrusted" and "disappointing." Participants also reported that the plant-based burgers were not as moist or "juicy" as the other options (p. 30). While this study was conducted to glean consumer perspectives on insect burgers specifically, the results highlight the perceived negative sensory aspects of plant-based meat.

Through Parry and Mitchell's (2019) online forced-choice experiment, taste came out as the most important attribute in consumers' intent to purchase plant-based meat. A majority of participants reported that a product's status as "tasty" (70%), "delicious" (69%), "satisfying" (65%), or "appealing" (56%) is important in determining whether to buy a plant-based meat product. Over half (54%) of participants intended to purchase plant-based products that were "meaty" as well. These findings reinforce results from previous research that suggested sensory appeal should be the prominent consideration in product development.

Consumers prefer certain meat-specific sensory properties. Regarding conventional meat, consumers' preferences for sensory qualities are highly specific, and consumers' preferences for plant-based meat may be similarly specific. Examples of these preferred properties are taste (Aaslyng et al., 2007; Morales et al., 2008), color, leanness, and juiciness (Font-I-Furnols & Guerrero, 2014). Additionally, some properties affect perceptions

of taste, such as color (Font-I-Furnols & Guerrero, 2014). Most importantly, some of these properties, such as preferred color, vary by culture and location. Plant-based meat developers aiming to create products that mimic conventional meat should research regional sensory meat preferences and develop products accordingly. Lastly, no matter the geographic location, the sensory components of high-fidelity plant-based meat products may initially repel vegetarian consumers, depending on their degree of disgust response to meat and their motivations for avoiding meat (Hoek et al., 2011a).

Appearance of Plant-Based Meat

Another sensory aspect that requires addressing is appearance. Elzerman et al. (2015) found that, in addition to similarity in other sensory attributes, similarity in appearance to conventional meat products was important for plant-based meat products. The shape of plant-based meat (ground, strips, pieces, slices, cubes) was important in terms of appropriateness. For instance, participants rated ground plant-based meat in a wrap 76/100, whereas they rated cubes in a wrap 44/100. In addition to preferred shape, most study participants expressed preferred color and flavor (e.g., brown and meat-like). Perceptions of specific appearance attributes, such as "bloodiness" and grill lines, were not tested. It is again important to note that this is an older study that did not test products that are commercially available now. Additionally, this study was conducted through an online survey, and thus appearance findings should be interpreted with caution.

Price

As identified by a qualitative study of U.K. consumers, both meat reducers and traditional meat consumers reported high price as the main barrier to consuming plant-based meat (Apostolidis & McLeay, 2016a). In contrast, vegetarians reported that the price of plant-based meat was "reasonable" (Apostolidis & McLeay, 2016a, p. 28). Elzerman et al. (2013) also found price to be a reported negative aspect of plant-based meat and thus a major barrier to its consumption.

Recent nationally representative results from Neff et al. (2018) reveal that the high price of conventional meat in the U.S. is one reason that consumers are reducing their meat consumption. However, it should be noted that meat reduction can be accomplished in a number of ways and does not necessarily indicate that a consumer is replacing conventional meat with plant-based meat. Price should be considered a barrier to consumer adoption of plant-based meat.

Parry and Mitchell's (2019) experiment found, as did previous research, that across dietary habits and generations, cost was the second-most important plant-based product attribute (behind taste). Sixty-two percent of participants reported intention to purchase a product that was "affordable." Parry and Mitchell (2019) examined this result in more depth and found that 31% of participants would pay a little more or a lot more for a plant-based alternative than for conventional meat, and a majority of these participants were flexitarians and millennials. Forty-five percent reported that they would pay the same amount as they would for conventional meat, and 24% reported that they would only pay less. These last two categories consisted mostly of omnivores, Generation X, and baby boomers.

Convenience

The product attribute "convenience" has many components: geographic locations of stores and restaurants that carry a product, ease and speed of preparation, cultural relevance, consistency with family traditions, and kid-friendliness. Both non-users and light/medium users of plant-based meat in the Hoek et al. (2011a) survey found plant-based meat less convenient overall than conventional meat. Some participants in the Elzerman et al.

(2013) interviews reported that cooking an equally delicious meal using plant-based meat instead of conventional meat may take more time. In an Australian interview study, participants reported that promotion of plant foods should incorporate messaging that explains "how to prepare quickly and easily" (Lea et al., 2005, p. 804). In line with these findings, 61% of Parry and Mitchell's (2019) participants reported intention to purchase a plant-based product that was "easy to prepare." Lastly, limited availability for purchase (i.e., absence in preferred grocery stores) is also a key barrier for consumers in the U.K. (Apostolidis & McLeay, 2016a). While ease of preparation and general product accessibility deserve special attention, the many aspects of convenience should be addressed in order to increase consumer adoption of plant-based meat.

Health Beliefs

As noted above in the section on drivers, health beliefs are a double-edged sword when consumers make food choices. In this section, we will explore how health beliefs may be barriers to plant-based meat adoption.

Beliefs around vegetarian diets impact consumer adoption of plant-based meat. For instance, in a study of former vegetarians in New Zealand, the most reported reason for returning to meat consumption was health concern (Barr & Chapman, 2002). Further, while most participants in the focus groups conducted by Elzerman et al. (2013) perceived plant-based meat to be high in protein, low in fat, and generally healthy, some participants reported concerns about plant-based meat's digestibility and possible nutritional deficiencies in children. Other participants conveyed concerns about sufficient protein content, highlighting an overall uncertainty about the healthiness of plant-based meat (Elzerman et al., 2013).

In a survey conducted by Hoek et al. (2011a), although non-users of plant-based meat reported that plant-based meat was better than conventional meat for weight control, they perceived it to be generally less healthy than conventional meat. These participants also reported a preference for plant-based meat products high in protein, low in calories, and rich in vitamins. The de Boer et al. (2017) interviews with heavy meat consumers found similar perceptions. Furthermore, while light/medium users of plant-based meat agreed to an even greater extent that plant-based meat was better for weight control, they agreed that conventional meat was better for health, although only marginally. Only heavy users of plant-based meat did not report negative health-related aspects of it.

Overall, these studies suggest that consumers perceive health as multicomponent (e.g., high protein content, low fat content, rich nutritional profile, effectiveness for weight control). Plant-based meat is not universally perceived as healthier with respect to all of these components. Barriers to consumption will exist where consumers perceive plant-based meat to be lacking with respect to any of them. Formulation and communication will help product developers and marketers overcome these barriers.

Lack of Familiarity

As noted in the section on drivers above, while interest in trying new and exciting food drives some consumers to eat plant-based meat, lack of familiarity with plant-based meat is a reported barrier to its consumption among other consumers. In the Elzerman et al. (2013) focus groups, participants reported that lack of familiarity in preparing plant-based meat hindered their consumption. Pohjolainen et al. (2015) and Lea et al. (2006) similarly found that lack of familiarity both of the product itself and of its preparation was a barrier to reducing meat consumption.

In a study conducted by Doebel and Gabriel (2015), participants viewed seven of 21 plant-based meal images and rated each meal's appeal and their likelihood of ordering the meal at a restaurant or cooking it at home.

These 21 images were categorized as "regular foods" (e.g., bean and rice burrito, roasted potatoes), "ethnic foods," (e.g., falafel sandwich, Indian stir-fry), "tofu dishes" (e.g., tofu pad thai, tofu scramble), and "vegan meat dishes" (e.g., veggie burger, vegetarian chicken nuggets). In likelihood of both cooking and ordering at a restaurant, regular foods outperformed all other categories, while vegan meat dishes consistently scored lower than regular foods and ethnic foods. These results suggest that familiarity with a dish strongly influences desire to consume that dish and that plant-based meat dishes are not yet widely perceived as familiar and thus are not preferable.

Elzerman et al. (2015) conducted an additional online study in which participants judged the appropriateness and attractiveness of six dishes that incorporated plant-based meat: spaghetti, rice, wrap, pizza, pasta, soup, and salad. About half the participants expressed intention to prepare the spaghetti, rice, and wrap dishes. Only about a quarter expressed intention to prepare the pizza, salad, or soup dish. The authors found that medium and heavy consumers of plant-based meat rated the spaghetti, rice, and wrap the highest. Consumers who had never eaten plant-based meat rated these same dishes the lowest, underscoring the influence of familiarity with plant-based meat on the appeal of certain meal types.

Exposure to new foods may reduce overall tendencies of food neophobia and thus may overcome lack of familiarity as a barrier (Pliner et al., 1993). However, using an in-home trial of 20 food exposures (meals containing tofu, Quorn, or conventional chicken), Hoek et al. (2013) showed that repeated exposure to new foods can both increase and decrease liking over time. Individual responses varied significantly, with some participants liking products more over time and others growing bored and liking products less. Tofu was the least boring product, with most participants liking it more over time, while Quorn and chicken were not liked more over time. The novelty of tofu may account for these results, as participants were already accustomed to chicken, and Quorn is very similar to chicken.

For some consumers, plant-based meat products took some time to get used to and to like, while other consumers initially liked the products but became bored with them over time. In practice, convincing consumers to keep eating a product they didn't like initially may be difficult. Accordingly, strategies that encourage new consumers to be more open to trying new or improved products will probably be more effective (Hoek et al., 2013). Strategies for maintaining liking, such as providing new recipes or meal ideas, may facilitate long-term usage.

Benefits and Barriers Summary

Overall, the key product-specific benefits that may increase consumer adoption of plant-based meat are health (weight control and low saturated fat and cholesterol); altruism (low environmental impact and improved animal welfare); ability to fit in well in a full meal context; and status as new, fun, and exciting. As discussed in Working Paper 5, different marketing campaigns could emphasize these various benefits.

When traditional consumers are not satisfied with plant-based meat products in terms of price, taste, and convenience, these deficiencies act as barriers to adoption (Parry & Mitchell, 2019). Hoek et al. (2017) showed that consumers were willing to adopt healthier and more sustainable food substitutes but only if their preferences for taste, price, and convenience were met. Only consumers who highly value health or ethical aspects of food will tolerate higher prices, lower sensory appeal, and less convenience.
Because of their different methodologies and target populations, the studies reviewed in this section vary in their findings. However, they do have some commonalities: They suggest that we can divide consumers into two segments—those who are more resistant to change and those who are more open to it (Hoek et al., 2011a; Hoek et al., 2017). Hence, no one-size-fits-all approach to encouraging plant-based meat adoption exists, and

implementing multiple strategies that target specific consumer segments rather than the "average" consumer is essential (Apostolidis & McLeay, 2016b; see Working Paper 2). A major challenge is developing targeted messages to groups more open to change while not inflaming or entrenching resistance among consumer groups less open to change (see Working Paper 5 for a more in-depth discussion of psychological reactance to messaging).

Because so little research on the benefits of and barriers to consumption of plant-based meat exists, we should be cautious when interpreting and applying the data from the aforereferenced studies. More research is needed in order to draw conclusions and make considerable claims.

Part I Summary

As a whole, plant-based meat has not yet achieved parity with conventional meat on several key perceived product attributes. These include familiarity, taste, convenience, price, and some components of health (e.g., protein and nutrient content). However, plant-based meat outperforms conventional meat in many components of health (e.g., low cholesterol content) and ethical benefits (improved animal welfare and lower environmental impact). Some non-neophobic regular meat consumers may also find plant-based meat appealing as an exciting new food (Apostolidis & McLeay, 2016a; Hoek et al., 2011a).

In sum, products with greater familiarity and sensory appeal (i.e., more meat-like products) will probably appeal to a wide variety of meat consumers.

Conclusion

Taken together, the reviewed studies identify the already-existing strengths of plant-based meat, including its ability to fit in a meal context, status as fun and novel, perceived health benefits, and benefits for animal welfare and the environment. However, the product attributes that act as barriers to plant-based meat adoption should be addressed, including less convenience, lack of familiarity, higher price, lower sensory appeal, and, paradoxically, health perceptions. Part II will provide recommendations for product development and improvement based on these research findings.

Part II: Product Attributes as Plant-Based Meat Drivers - Recommendations

Introduction

Part II will present product development recommendations based on the research synthesized in Part I. Our recommendations will focus on current consumers of conventional meat, including traditional meat consumers and meat reducers. Creating products that fully meet all the desired product qualities may not be immediately possible, and product developers will probably be faced with trade-offs. Differentiation exists within the flexitarian consumer segment, and having a broad range of products from which to choose will be beneficial. As technological innovation improves the sensory aspects of plant-based meat, more-resistant consumers may more easily be convinced by the plant-based meat that early adopters are eating around them.

Product Development Recommendations

Products should be developed to provide personal benefits and reduce barriers for the consumer. Personal benefits include pleasurable taste and other satisfying sensory aspects of plant-based meat, affordability, convenience, health gains, product familiarity or novelty, and appropriateness in appealing dishes and meal contexts.

Sensory Aspects and Likeness to Meat

Sensory aspects of plant-based meat refer not only to the taste and flavor of a product but to the smell, appearance, and texture. In accordance with the literature reviewed in Part I, a primary recommendation is to develop products that are more meat-like in these aspects. This will appeal to the traditional meat consumer group and the meat reducer group, since these consumers desire products that are more similar to conventional meat. First, plant-based meat should be composed of a variety of textures rather than a single consistency. Second, the product should be moist and juicy, although not watery. Third, the product should be tougher and less soft (Elzerman et al., 2013). Fourth, it should be meat-like in shape and color (Elzerman et al., 2015). Incorporating these sensory changes will meet the majority of consumers' desire for a product that is closer to the more familiar meat product.

A last sensory-related component to improve is plant-based meat's ability to deliver satiety, or a feeling of fullness between meals. Hoek et al. (2011a) showed this to be especially important to meat consumers. Protein is more satiating than either fat or carbohydrates (Stubbs, 1998). By developing plant-based meat products with high protein content, developers can meet the need for fullness.

Price Adjustments

Both Parry and Mitchell's (2019) and Apostolidis and McLeay's (2016b) choice experiments suggest that price is the first- or second-most (after taste) influential factor for the largest consumer segment. Targeting price-driven consumers will reach not only the majority of people but the people who consume the most conventional meat. When plant-based meat producers are able to reduce price, strongly attached meat consumers will better accept the products. Additionally, coupons may encourage consumers to try the products and eventually become regular consumers.

Convenience

Plant-based meat should be easy and quick to prepare and fit in easily with consumers' habits and social norms, including shopping and preparation (Parry & Mitchell, 2019). For example, U.S. consumers are fairly accustomed to eating a sandwich for lunch. Plant-based deli slices are prepared in the same manner as turkey deli slices, requiring no new skills or additional mental energy. Overall, products should be as quickly and easily prepared as conventional meat products. Plant-based meat products should also be easy to locate in the grocery store for the target consumer. One way to accomplish this is a "protein aisle" where plant-based meats are adjacent to conventional meats. The adjacent location makes it easy for traditional meat consumers and flexitarians to find the products while keeping them separate for vegetarians and vegans (discussed further in Working Paper 4).

Meal Context

One avenue for increasing plant-based meat adoption may be to present the product as part of a larger meal context rather than as an individual ingredient (Elzerman et al., 2011). This focus on meal context has two advantages. First, when plant-based meat is combined in appropriate and expected ways with other food, consumers are more likely to adopt it (Elzerman et al., 2015). Second, combining foods may mask flavors and textures of plant-based meat that certain consumers may find unappealing. A few illustrations of this strategy are Gardein's skillet meals; Tofurky's Holiday Feast; Yves's falafel in a pita; and Sweet Earth's artisan bowls, mini meals, and breakfast sandwiches. In developing new products, it is important to focus on consumer perceptions of the appropriateness of the meal concept. Furthermore, meals should be named as specifically as possible (e.g., instead of "spaghetti with plant-based meat," the product label should read "spaghetti with plant-based ground beef").

Product developers should seek to create products that fit in dishes currently perceived as appealing. The Better Buying Lab has been researching and testing appealing plant-based menu items (i.e., "power dishes") with the potential to become menu favorites (Vennard, 2018). These dishes are broadly appealing and well-known. Thus far, the highest-performing items tested include the avocado club (which swaps chicken for avocado), the veggie bowl (an array of veggies atop a bowl of grains), and the blended burger (with a patty composed of 30% mushroom and 70% beef). As these and other popular items make their way onto menus around the globe, consumer adoption of plant-based eating in general will increase.

Both traditional meat consumers and meat reducers are strongly driven by tradition and want familiar recipes (Apostolidis & McLeay, 2016a; Parry & Mitchell, 2019). Testing of products for consumption at home or in a restaurant may be improved by focusing on a specific dish or broader meal context. One related notion is "food harmony," or how well foods complement one another (Lawless, 2000). Food harmony is an important consideration for consumers and is usually determined by traditional and cultural understandings of appropriate food matching. Pairing plant-based meat with other foods (e.g., lasagna, curry) may improve its perceived taste and other perceived sensory aspects. This is especially true for meat reducers and traditional meat consumers. For these omnivores, it may be important that plant-based meat products have a context-appropriate shape and appearance and be part of a dish. A focus on the meal context will maintain, even in light of cultural centrality, both the social context of consumption and the cultural norm of meat-centric meals (if applicable) (Spurling, McKeenan, Shove, Southerton, & Welch, 2013).

Familiarity and Novelty

Plant-based meat is uniquely positioned to meet both the need for familiarity and the desire to try new and exciting foods. In general, to appeal to traditional meat consumers and meat reducers, plant-based meat should be framed as familiar. Products should be similar to their conventional versions in sensory aspects, packaging, preparation, and marketing. For instance, if Product A mimics the packaging of a typical meat package, traditional meat consumers and flexitarians may be more inclined to try it because it cues familiarity. However, if Product B's packaging is unique and the product is framed as a specialty plant-based product, then traditional meat consumers and flexitarians may be less likely to try it.

Certain methods may encourage meat consumers who are uncertain to try the new food. For example, happy hour appetizers could include plant-based burger "sliders" or a plant-based chicken skewer. This would reduce the perceived potential for "loss," in that the customers would not give up the meal with which they were familiar for something they might not like. Restaurants could also offer a sampler platter that includes plant-based meat.

Cultural Relevance

Apostolidis and McLeay (2016a) found that among U.K. meat consumers, it is important that food be consistent with social norms. Plant-based meat products should easily replace meat products, not only functionally but socially. Over 30% of Parry and Mitchell's (2019) participants reported that a plant-based product's status as "socially acceptable" was important to their decision to purchase. For instance, consumers must be able to prepare a meal for friends and family that fits social expectations.

Efforts to change food behavior should respect cultural identity, standards, and customs (Vinnari & Vinnari, 2014). Promotion of plant-based meat that incorporates the target population's culture will be both effective and appropriate. One core approach might be substitution practices. Plant-based meat already meets the function of substitution, in that many conventional meat meals can be made with plant-based meat, closely fulfilling the desires of the consumer (Spurling et al., 2013). Through substitution, plant-based meat upholds cultural identity by allowing for plant-based versions of culturally central dishes.

Ruby and Heine (2012) suggest that social norms regarding food may be a stronger predictor of food choice than one's own preferences and that this is more the case in collectivist cultures than in individualist cultures. Thus, strategies for promoting plant-based meat and development of product attributes should vary considerably from culture to culture. Once a target population segment is identified, relevant plant-based meat products may be developed with this segment's culture in mind. For instance, if targeting traditional meat consumers in the U.S. who consume Mexican cuisine, promoting plant-based dishes such as chili lime carnitas made with jackfruit or soyrizo quesadillas could be effective.

Health Beliefs

Currently, many consumers perceive plant-based meat to be high in protein, excellent for weight control, and low in saturated fat. Plant-based meat should retain these qualities. However, consumers also perceive it to be lower in overall nutritional value in comparison with conventional meat. More care should be taken to improve the products along other components of health. For example, a plant-based beef patty could be fortified with vitamin B12 and zinc (nutrients found in conventional beef). Ease of digestion is also an important product attribute. Highlighting either the product's familiar ingredients or its fiber content will reassure consumers that the product is indeed digestible (Elzerman et al., 2013).

Parry and Mitchell (2019) found that protein content is a salient concern for consumers and high protein content a salient desire. Accordingly, plant-based meat companies should continue to develop products with high protein content per serving and promote this protein content as a primary benefit of the product.

Additionally, consumers motivated to reduce meat consumption for health reasons perceive traditional red meat as less healthy and white meat (e.g., chicken breast) as more healthy (Fessler et al., 2003; Latvala et al., 2012). It is important to develop a broad range of nutritious and delicious plant-based products for consumers who are highly health-conscious. This will maintain the perception of the products' healthiness when health-motivated consumers switch out traditional meat for plant-based meat.

Future Research Directions

The research reviewed in Part II of this chapter underscores thematic findings that impact future studies in this area. First, future research on consumer adoption of plant-based meat should test products in a meal context, as previous research has consistently shown that plant-based products are better liked when eaten in an appropriate meal rather than on their own.

Second, and along similar lines, the better consumers are able to envision themselves in hypothetical contexts, the more likely they are to accurately answer questions about real-life consumer adoption. For example, Siegrist et al. (2019) tested virtual reality's ability to mimic actual purchasing options in a virtual shopping environment. The researchers found that the virtual shopping trip had the same outcomes as a real-life shopping trip. Thus, virtual reality may provide researchers with numerous benefits, including the use of fewer resources, a controlled setting, and sound internal and external validity. Studies that closely mimic the shopping, preparation, or consumption experience of participants will improve the ecological validity of their own results.

Third, culinary programs, in collaboration with researchers, could test new menu dishes that are easily accepted by a broad set of consumer demographics. This will provide insight into which meal contexts are most appropriate to the widest audience. Moreover, researchers should first test menu offerings with low loss potential to the consumer (e.g., sample platter, appetizer) to examine the influence of loss potential on consumer adoption of plant-based meat.

Future research on consumers' perceived benefits of plant-based meat and barriers to its adoption should replicate the reviewed studies using current and improved plant-based meat products (e.g., the Beyond and Impossible burgers) for potential comparison of results to previous findings. This would provide an opportunity to measure consumers' shift in perception (if it has shifted) alongside product improvement. Experiments that examine the degree to which external barriers (e.g., cost) outweigh perceived benefits of plant-based meat (e.g., weight loss) would also yield useful insights. For example, is there a potential perceived benefit of plant-based meat that may outweigh the barrier of cost?

While previous research highlights the benefits and barriers of plant-based meat as reported by non-users, light users, medium users, and heavy users of plant-based meat (Hoek et al., 2011a), future studies should identify which products each group prefers. For instance, do heavy users (probably vegetarians) prefer plant-based chicken products, while light users prefer plant-based ground beef patties? Would consumers substitute certain plant-based products for certain conventional products (e.g., a chicken breast)? Furthermore, does any group prefer unanalogous products (e.g., a black bean patty versus a soy-based patty that resembles ground beef)? Identifying the relative sizes of these consumer segments will further guide producers in product development targeting decisions.

Regarding health beliefs, more in-depth study of consumers' specific nutritional concerns is necessary. Consumers perceive conventional meat as overall more nutritious, despite perceiving plant-based meat as high in protein (Elzerman et al., 2013). Probing more deeply into what various consumer segments perceive to be lacking will guide plant-based meat development in meaningful ways.

Reaching new consumers requires first identifying the attributes of plant-based meat products that initially attract consumers to them and then identifying the attributes that keep consumers purchasing them. For example, which attributes of plant-based meat appeal to consumers motivated to try it because it offers dietary versatility through new foods?

In terms of studies examining products themselves, several core product attribute questions must be answered. First, which sensory preferences are the most important to consumers (e.g., shape, taste, smell, tenderness, juiciness, color)? Second, for "power dishes" (i.e., plant-based dishes determined to have a broad appeal and ordered most frequently at restaurants), which sensory aspects are most desired in specific contexts? For example, would a beef strip perform better than a beef cube, and would either appeal to consumers at a specific time of day? Third, which dishes are most appropriate for plant-based meat and in which consumer segment? Results from studies that seek to answer these three questions will direct both the sensory improvement priorities and the product types for plant-based meat producers, increasing overall adoption.

Lastly and most broadly, focus group studies would be useful in discovering desired product types and attributes that do not yet exist. For instance, which plant-based products not yet in market have high consumer appeal? Which consumer need states call for which new products? Answers to these questions and to those raised by the research topics listed above will provide plant-based meat companies greater direction in developing products that appeal to a wide variety of consumers or are specially tailored for a specific niche.

Conclusion

Overall, to increase adoption of plant-based meat, product development that aligns with these research findings is imperative. It is safe to assume that all consumer segments would be more likely to purchase plant-based meat if the price were lower, and the likelihood of purchase would increase for traditional meat consumers and meat reducers if the product's sensory attributes were more similar to those of conventional meat. Rather than rely solely, or even largely, on ethics or health claims, marketers should place greater emphasis on attributes of sensory appeal, affordability, and the various components of convenience. Health concerns (e.g., uncertainty about protein and nutrient content, digestive difficulty) should be addressed by developing products that are nutritionally comparable to conventional meat. Meal context should also be taken into account to aid in the development of either familiar dishes or exciting new products.

CHAPTER 04: Choice Architecture

Key Findings and Recommendations

- Cognitive theories inform us that there are two primary types of decision-making: (1) unconscious, quick, easy, and uninfluenced by logic; and (2) conscious, rational, and thorough. The two core theories that explain this decision-making are Daniel Kahneman's System 1 / System 2 thinking and Petty and Cacioppo's Elaboration Likelihood Model.

- Choice architecture interventions encourage, or "nudge," consumers to make a desired choice using the unconscious type of decision-making. These nudge strategies include product placement at a grocery store, labels on products, listing a food item first or last on a menu, using a "default" ingredient on a menu, providing menu item descriptions, or a combination of these strategies. Essentially, choice architecture strategies make it easier for consumers to choose plant-based meat, so the likelihood of consumers making that choice will increase.

- Marketers can build on already-existing mental categories to strategically place plant-based meat where it will be more convenient for consumers to purchase, such as adjacent to the conventional meat section. This strategy may reduce the psychological effort in purchasing plant-based meat products. Future research should confirm this with experimental studies in real-life retail settings.

- Labeling nudges also play a useful role in consumer purchasing. Health and environmental labels on product packages and in menus, such as red-green-yellow traffic light labeling for calorie count, are useful nudges for those who currently limit meat consumption, as long as they don't negatively impact taste expectations.

- Product labels impact consumer intention to purchase plant-based meat. Describing a product as a specific type of meat preceded by "veggie" or labeling it as "[type of meat]-less" (e.g., "veggie chicken" or "chickenless") does not appeal to most consumers. Alternatively, product descriptions that incorporate the terms "plant-based" or "plant protein" are more effective, as are labels that highlight protein and fiber content or familiarity, such as "all-American."

- Menu item descriptions that are more appealing and detailed (e.g., highlighting a product's taste or its ingredients' geographical origin) increase sales of vegetarian menu items in a restaurant setting.

- Indulgent descriptions, as opposed to basic descriptions or no descriptions, of plant-based meat items on menus may increase a consumer's likelihood of ordering them.

- Menu-design structure can increase selection of plant-based meat through the availability of more plant-based options, default choices, a chef's recommendation box, an integrated menu, or placement of plant-based meat dishes first or last on a menu.

- Many of these findings and recommendations are based on studies that did not test labeling, menu item descriptions, or menu design on plant-based meat specifically. One exception is Parry and Mitchell's (2019) implicit test of the plant-based category. There are many opportunities for future research on choice architecture interventions with plant-based meat.

Introduction

Approaches involving choice architecture (i.e., influencing consumer decisions in the purchasing environment, such as the grocery store, by designing the way in which choices are presented) are viable and resourceful ways to increase consumer adoption of plant-based meat. This section will first provide a brief overview of the theories behind choice architecture and then outline each of the approaches—product location, product labeling and packaging, menu design, and combined approaches—in the context of plant-based meat.

Choice architecture encompasses numerous strategies, including labeling and menu item descriptions. Both of these strategies rely on nuanced language. Accordingly, there is overlap between the recommendations provided in this paper and those provided in Working Paper 5, which reviews messaging literature and provides in-depth additional language recommendations.

Theories Supporting a Choice Architecture Approach

Cognitive theories provide frameworks and models for understanding the mental processes involved in decision-making and behavior. Both the System 1 / System 2 framework and the Elaboration Likelihood Model discussed below dichotomize decision-making into conscious and unconscious processes. A major takeaway for influencing consumer decisions around plant-based meat is the goal of leveraging unconscious processes to guide consumer purchasing choices.

System 1 / System 2

Daniel Kahneman's (2013) System 1 / System 2 framework characterizes human thinking and decision-making as a dichotomy between two modes of thinking: fast (System 1) and slow (System 2). Slow thinking is rational and deliberative. Since it requires additional mental effort, slow thinking produces static judgments and is used less often. On the other hand, fast thinking is more akin to a reflex, operating on intuition, emotion, and heuristic judgments (e.g., "mental shortcuts") that require less mental energy. Kahneman's framework also aligns with biological theories that claim these two modes developed out of evolutionary needs for mental efficiency.

System 2, or slow thinking, is how most individuals envision their decision-making: as fully conscious and rational. System 2 thinking is especially useful in high-stakes decisions. However, this slower mode of thinking is not as frequently used in everyday life because of the cognitive effort required to make System 2 decisions. Instead, the human mind seeks to preserve mental energy by predominantly using System 1 thinking. System 1, or fast thinking, relies on previously made associations, allowing one to simply "jump to conclusions" to get through everyday decisions.

Regarding dietary behavior, Liu et al. (2014) noted that food choices were not often rational decisions and thus, not often guided by System 2. Because of this, simply supplying consumers with information that requires engaged thinking (i.e., prompting them to enter System 2 decision-making) is often insufficient to create sustained behavior change. In the more automatic and effortless System 1 decision-making process, consumers are influenced by irrelevant factors: "present-based biases, visceral factors, choice presentation format, social consumption norms and incentives, and a host of other influences" (Liu et al., 2014, p. 13). All of these factors and associations influence one's outcome decision in ways that the individual decision-maker rarely recognizes.

When applied to the food decision context, these mental shortcuts of System 1 (fast thinking) could be utilized in shelving strategies (in conventional stores), website categorization (e-commerce), product messaging (both on packages and via advertising), and restaurant menu design. In fact, many of the mental shortcuts of System 1 are already utilized in food environments. For example, think of placement of sweets at the grocery check-out counter, appealing designs and attractive buzzword labels on packaging, or marketing strategies that create positive emotional associations with their products. Many meat reduction interventions have already utilized such choice architectural strategies with statistically significant positive results (Bianchi, Garnett, Dorsel, Aveyard, & Jebb, 2018).

To increase consumption of plant-based meat, promoters can utilize fast-thinking shortcuts to leverage consumers' categorization of food choice. For example, individuals may categorize a specific food product in three broad mental steps: "Food → Meat → Chicken" (Terrien, 2017). This provides an opportunity to utilize these categories in the promotion of plant-based meat. One way to integrate within an existing category is to refer to plant-based products with meat-like terms, such as "chick'n" or "beefy," thereby making the mental shortcut easy for consumers.

We can also expand consumer choice by integrating plant-based meat into the existing category (meat) with a new dedicated subcategory (e.g., plant-based meat or plant-based protein). We recommend working to transition the second-tier category (currently meat) into a new category: protein. Under this new category, consumers would have access to many protein choices all in the same general location. This category would include options for conventional meat, plant-based meat, and, in the future, cultivated meat. This integrated category approach makes the mental shortcut easy and accessible for customers, increases familiarity and adoptability, and creates positive associations with already-familiar products. Adjacent placement (rather than full integration) also clearly indicates to all consumers a distinct subcategory (plant-based) and provides convenience to all consumers (i.e., a nearby location for flexitarians and a distinct space for vegetarians and vegans).

Lastly, further heuristics to influence System 1 thinking in choosing plant-based meats could include messages around and within the product's aisle, not necessarily in a product's labeling or categorization. A simple in-aisle poster exhibiting a photo of a doctor with a message about heart-healthy options would provide enough contextual influence for a consumer to associate heart-healthy options and plant-based meats. Further research should be done in the context of influences of both System 1 and System 2 thinking in consumer purchases of plant-based meat.

Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) aims to explain the different ways through which humans process stimuli, why these methods are used, and their outcomes on attitude change. Like System 1 / System 2 thinking, the ELM proposes two major routes to persuasion: the central route and the peripheral route (Petty et al., 1983).

Individuals can be persuaded through the central route when they have devoted a significant amount of cognitive energy toward a decision. Typically, a high level of internal message elaboration is involved, and therefore, the resulting attitude change is enduring, resistant, and predictive of behavior. For example, if a person has given several weeks' worth of thought to plant-based alternatives, conducted in-depth online research, and engaged in discussion with their healthcare provider about reducing their meat intake, then they are more likely to consume

plant-based meat for a longer period of time than are those who make the decision to consume plant-based meat using the alternative peripheral route.

In the peripheral route, persuasion is based on an individual's inferential association of positive or negative cues with a stimulus. These associations are unrelated to the actual quality of the stimulus. Peripheral cues involve various heuristic factors (e.g., attractiveness of the message source or the production quality of the message). An example is a brightly colored candy package with a recognizable logo rather than an unfamiliar candy with dull packaging.

The likelihood of elaboration (or processing a decision using the central route) will be determined by an individual's motivation and ability to evaluate the presented information.

Applications to Plant-Based Meat

Those who currently purchase traditional meat products do so because the products are familiar, and this decision-making happens in the peripheral route. In the context of plant-based meat consumption, for persuasion to take place and for a consumer to consciously try plant-based meat (and continue purchasing plant-based meat), some degree of central route processing needs to take place. On the other hand, the more associations one makes between the stimulus (e.g., a product's promotional message, such as "food for healthy people") and positive heuristic attributes (e.g., "everyone is doing it, so should I"), the more likely one is to be convinced when using the peripheral route. However, this will not be sufficient to create long-lasting behavior change (Cialdini, 1993).

The ELM may pose significant implications for the development of marketing messages, particularly in how firms advertise plant-based products. Future studies may assess subjects' ongoing attitudes and beliefs toward conventional meat, plant-based proteins, and a particular firm's credibility. Exposing these subjects to varying treatments of advertisements that are short and low on elaboration (e.g., a 15-second video presenting a brief explanation of health benefits and taste attributes of the plant-based protein product, coupled with demonstration of company credibility) or longer ads that are high in elaboration (e.g., 30–60 seconds with a more detailed explanation of health benefits and taste attributes of the plant-based protein product) could yield insightful findings as to the degree to which elaboration impacts consumer decisions. However, ELM research should note that a participant may not engage in message elaboration simply because an elaboration cue is shown (such as the video ad).

In reference to segmentation, it should be noted that the primary target audience for choice architecture interventions is flexitarians, since these consumers have probably already centrally processed their decision to eat less conventional meat. Within the Diffusion of Innovations framework (Rogers, 2003), choice architecture strategies will be influential with the early adopters, early majority, late majority, and laggards. Again, while the primary audience is flexitarians, choice architecture approaches may softly influence the late majority and laggards by normalizing plant-based meat choices.

Overview of Choice Architecture Approach

Developed by Richard Thaler and Cass Sunstein, nudge theory describes how relatively subtle changes in one's environment can influence decision-making (Thaler & Sunstein, 2008). Such changes to choice architecture do not restrict an individual's ability to make different choices but often encourage desired decision-making, with results that are in the decision-maker's or society's interest. Because of these two features, Thaler and Sunstein describe nudges as drawing from a philosophy of "libertarian paternalism."

A commonly cited example of nudge theory involves defaults in workplace pension programs: Employees are automatically enrolled in a pension plan but can opt out if they choose. When this is the case, employees are more likely to save for retirement than if they are not automatically enrolled in the plan and have to opt in. Additionally, this same type of opt-out nudge is utilized to increase organ donations. Certain countries' organ donation programs automatically enroll residents as organ donors, unless individuals specifically request to be taken off the list. In the retail context, grocery stores already use nudge tactics to promote certain products at the check-out line. The checkout itself is a place where customers often wait until it is their turn to pay. Grocers place candies and magazines alongside the check-out line, thus adjusting the choice environment for those waiting in line and influencing them to grab a last-minute indulgence on their way out of the store.

We conclude that choice architecture will probably be a useful approach in promoting the adoption of plant-based meat. This is because (1) many consumers aren't aware of the health and environmental effects of meat consumption and are therefore unlikely to think more deeply about their food choices or consciously adjust their purchases, and (2) regarding health and dietary decisions, decision-making is complex and difficult to influence via messaging (Hartmann & Siegrist, 2017; Roberto & Kawachi, 2014). Thus, to most effectively guide consumer food choices, the choice architecture approach is viable and likely to be effective regardless of consumers' level of engagement in their food decision-making.

The choice architecture approach structures the choice environment to optimally nudge individuals toward desired decisions. As described above, providing a default choice is one example of structuring the choice environment, but there are several categories of nudges. Arno and Thomas (2016) categorized choice architecture approaches as follows: environmental changes (e.g., olfactory or social influence), perception (e.g., emotional priming), availability of food (e.g., convenience or portion size), and knowledge-based changes (e.g., labeling). Hollands et al. (2013) categorized choice architecture somewhat differently: targeting properties of objects or stimuli (ambience, design, labeling, presentation, sizing); placement of objects or stimuli (availability, proximity); or combined approaches (priming, prompting). These classification systems highlight the many types of nudges that could be used in the context of promoting plant-based meat.

Many nudges have been successfully implemented in decision-making contexts related to food choice. In their meta-analysis of nudge-based nutritional interventions, Arno and Thomas (2016) examined several types of interventions, including the following: providing caloric content on menus, providing nutritional content on menus, altering portion size, and altering plate size. The meta-analysis found a significant and meaningful effect, with an average 15% increase in healthy food choices across all intervention types. These results suggest that nudge interventions are a promising area for further research and application to plant-based meat. However, research findings are mixed, and some experts believe that the evidence for the impact of nudges is weak (Marteau et al., 2011). Therefore, it is important to test these strategies in the context of plant-based meat and in real-life settings.

Nudges in food contexts have also been tested as health ratings on products in supermarkets, product locations in cafeterias, and default menu designs in restaurants. The majority of these approaches have aimed to improve health outcomes, although some have aimed to decrease environmental impact. Only a small number have explicitly targeted meat consumption (see Bacon & Krpan, 2018; Campbell-Arvai et al., 2014; Gravert & Kurz, 2017). We are unaware of any research that has explored the potential to nudge consumers toward selecting plant-based meats specifically, but we believe that this strategy holds significant promise.

By using nudge techniques, we may be able to target "early adopters" (i.e., consumers who currently restrict their meat consumption or occasionally consume plant-based meat). Over time, as plant-based meat becomes increasingly adopted, we may find less resistance from "late adopters" (i.e., consumers who currently avoid or are unaware of plant-based meat). This would align with Rogers's theoretical understanding of how new innovations are adopted over time (see Diffusion of Innovations Theory; Rogers, 2003). In the following sections, we outline specific nudge strategies that research demonstrates can be utilized to inform current approaches to both increasing plant-based meat consumption and guiding future research. Our synthesis focuses on product location, product labeling and packaging, menu design, and combined approaches.

Increasing Convenience Through Product Location

Synthesis of Research Findings

In attitude surveys, consumers consistently indicate that convenience is an important factor in food purchasing decisions (e.g., International Food Information Council, 2018). This finding has been corroborated in food-choice experiments. For instance, Liu et al. (2014) noted several studies that show that making food easily accessible increases the likelihood that it will be consumed. For example, when ice cream is in an open cooler rather than a closed cooler, more is consumed (Levitz, 1976), and when water is placed within reach rather than 20 feet away (Engell et al., 1996), more is consumed. When unhealthy items are placed in prominent locations in a supermarket, these unhealthy items are more likely to be purchased, and healthy items are less likely to be purchased (Kerr et al., 2012).

Placement has also been shown to influence food consumption in a buffet setting. Kongsbak et al. (2016) conducted an experiment comparing two separate buffet lines. The control buffet line presented pasta, bread, conventional meat, and mixed salad, in that order. The experimental buffet line presented the salad and conventional meat first and then the bread and pasta. Participants who visited the experimental line ate more salad and less pasta. However, overall food consumption and, specifically, meat consumption were the same for both lines. Although this study did not directly test plant-based meat products, it demonstrates that product location can be a useful strategy for encouraging replacement of one option for a healthier option (in this case, salad instead of bread or pasta). This concept can be translated to plant-based meat as a replacement for conventional meat.

Practical Applications

Results from the studies outlined above suggest that placing plant-based meat in an easily accessible area can increase the likelihood that it will be purchased and consumed. We recommend, however, that plant-based meat be placed adjacent to the conventional meat section to decrease cognitive effort exerted in purchasing plant-based meat. Currently, in most grocery store settings, plant-based meat is placed in a separate "meat alternatives" area. Consumers report a preference for this placement method (Parry & Mitchell, 2019). However, if traditional consumers who normally shop for protein in the meat aisle eventually seek to purchase plant-based

meat products, they must exert extra psychological and physical effort to reach these products. Placing plant-based meat products alongside conventional meat products in a "protein aisle" may help overcome this barrier. Thus, placement strategies should continue to be tested in ecologically valid settings, such as supermarkets. In a buffet setting, placing plant-based meat ahead of conventional meat may increase the selection of plant-based meat and decrease the selection of conventional meat.

Future Research Directions

We are unaware of research that tests the effect of product location of plant-based meat on actual consumption levels. As discussed above, convenient product placement has been shown to increase consumer purchasing. While consumers may report a preference that plant-based meat be placed in its own area of the grocery store (Parry & Mitchell, 2019), experimental research should examine how product locations influence actual plant-based meat sales rather than rely solely on consumers' stated location preferences. However, we should approach this implementation with some degree of caution, as placement of plant-based meat next to conventional meat may *not* increase selection and purchase of plant-based meat for various reasons. For example, direct comparison of the two options may reduce flexitarians' desire to purchase plant-based meat, as the strong visceral cues to conventional meat may drive selection in the immediate purchasing environment (Liu et al., 2014). Additionally, some current consumers of plant-based meat (vegetarians and vegans) may prefer to avoid the conventional meat aisle, as they may feel uncomfortable selecting products from it.

However, several supermarket chains in Europe and Australia, including Woolworths, Coles, and Sainsbury's, shelve plant-based meat products in the meat section, indicating that such placement has proved successful for their shoppers. Kroger, the largest conventional grocer in the U.S., is currently testing a dedicated four-foot plant-based meat set in the meat aisle with results expected in 2020. Albertsons, also one of the largest U.S. grocers, already has a dedicated plant-based meat set in many of their stores. Heinen's, an Ohio-based grocery chain, placed an integrated plant-based meat set within their meat department and saw sales and dollar velocity increases as a result. These observations suggest that retailers are headed in this direction. Future studies on this type of intervention would help validate the early outcomes of product location and placement.

Specifically, research should examine the impact on consumer purchasing behavior of placing plant-based meat next to conventional meat. Continued collection of self-report data, case studies, and experiments such as these will provide evidence for, and a better understanding of, the influence of placing conventional and plant-based meat products where they can be compared in the immediate food-choice environment. Moreover, research should explore how outcomes vary in accordance with an individual's current meat consumption habits.

Product Labeling and Packaging Cues

Synthesis of Research Findings

Product labeling is another nudge strategy that can be employed to move individuals toward or away from certain products. It can be used to convey a variety of information to the consumer and employed in numerous ways, including traffic light labeling (i.e., green, yellow, red), informational labeling (e.g., nutrition callouts), or colors and visuals (such as red to connote spicy or product photos to communicate taste). These may differ in their impact. Additionally, the language used to describe the ingredients in plant-based meat products can impact consumer choices (e.g., "containing no animal components").

The following section summarizes the research on the most common types of choice architecture labeling

interventions tested in the plant-based foods context: health and environmental labels. We also report on plant-based category descriptor labeling studies. Importantly, health and environmental labels and category descriptors are overall not highly influential in comparison with more traditional drivers, such as taste, familiarity, and freshness (Parry & Mitchell, 2019). We discuss messaging interventions for these most influential motivators in Working Paper 5. Of the three label types (health, environmental, and category terms), health labels are the most effective and may be useful for certain segments and contexts. Below we summarize the available literature on these types of labels as a choice architecture intervention.

Plant-Based Category Descriptors

Preliminary research suggests that word choice in labeling plant-based foods may be influential in product selection. The Good Food Institute (2016) conducted an online U.S. consumer perception survey to assess food label preferences. Respondents indicated that they were more likely to purchase a product labeled "plant-based" than a product labeled "vegetarian," "soy," or "vegan." Additionally, a commercial study conducted by Mattson Technology in 2016 examined perceptions of the terms "plant-based" and "vegan" (Watson, 2018). "Plant-based" was generally more preferred than "vegan" in a range of forced-choice questions. "Plant-based" was associated with food that fit these descriptors: "tastes better," "healthier," and "more for me." Study participants tended to interpret "plant-based" as a dietary choice and "vegan" as a lifestyle choice.

However, Faunalytics surveyed U.S. meat consumers to identify significant comparisons among labeling terms (Anderson, 2019). In an early phase of the study, consumers (N = 565) rated 22 descriptors in terms of sound (i.e., "sounds good") and likelihood of trying the product. Results showed that all descriptors performed similarly and neutrally, with only "feel-good" performing statistically better than the other terms. In the next phase, an online product-rating experiment, eight labels for a plant-based burger ("vegan," "plant-based," "clean," "direct protein," "feel-good," "mojo," "planet-friendly," and "zero cholesterol") were paired in all possible combinations, and participants (N = 1,431) were asked to make head-to-head choices between the two terms in each pair. In this later study phase, the tested outcome was which of the two choices sounded better. Overall, "feel-good" and "vegan" performed best—both above "plant-based"—in terms of sounding better. "Feel-good" was significantly better-sounding to young people, while "vegan" was better-sounding to women and older individuals. "Plant-based" was also better-sounding to women.

In a follow-up to their 2016 findings, The Good Food Institute tested plant-based meat descriptors in a three-part study. In the first phase, participants (N = 305) rated the appeal of 12 descriptors. "Plant-based" and "plant protein" rated the highest. This same phase also tested the appeal of a "vegan" versus a "plant-based" on-package seal. The "plant-based" seal scored higher than both no seal and the "vegan" seal, although the difference was not statistically significant. Phase two was a randomized experiment. After viewing an image and product description of a "vegan," "plant protein," "meatless," or "plant-based" burger, participants (N = 771) rated the product's appeal, as well as their likelihood of trying and purchasing the product. Although results were not statistically significant, "meatless" performed worse than the other terms. The third phase (N = 396) replicated the methods in phase two but omitted the image of the plant-based burger to decrease the possibility that the image would impact participants' responses. Results indicated that the image made no significant difference in responses between the two phases. Considering this study's large sample sizes and lack of significant results, we can conclude that consumers may not be strongly influenced by plant-based descriptors, especially when not asked to focus on the terms specifically.

Parry and Mitchell (2019) also explored implicit consumer perspectives on descriptor terms and found that category terms were among the lowest of implicit motivators (taste, tradition or familiarity, freshness, health or nutritiousness, altruistic benefits, and specific nutritional claims were all stronger influencers). However, the study

also compared category terms with one another. In this test, participants were exposed to one descriptor at a time and indicated whether the presented term did or did not make them want to buy a product with that label. The influence of plant-specific terminology on purchase intent varied. The terms were as follows: "plant protein" (56%), "plant based protein" (56%), "100% plant-based" (53%), "plant based" (53%), "100% plants" (52%), "plant based meat" (42%), "plant powered" (41%), and "plant based seafood" (31%). Each of these performed significantly better among flexitarians than among omnivores: 74% versus 52% for "plant protein," 78% versus 51% for "plant based protein," 72% versus 49% for "100% plant-based," 76% versus 48% for "plant based," 76% versus 46% for "100% plants," 60% versus 38% for "plant based meat," and 66% versus 36% for "plant powered." Common labels that specifically indicated a plant-based product were also tested: "veggie" (54%), "vegetarian" (44%), "meat free" (42%), and "vegan" (35%). Describing plant-based meat products as "veggie beef," "veggie chicken," "veggie pork," and "veggie fish" performed poorly, with intent to purchase percentages ranging between 23% ("veggie fish") and 41% ("veggie beef"). Along these same lines, a majority of participants were less inclined to purchase products described as "slaughter-less" (38%), "beefless" (34%), "chickenless" (31%), "porkless" (31%), and "fishless" (26%). Overall, millennials consistently reported higher intention for each item than Generation X and baby boomer participants. The results showed that while category terms are overall not very influential, the most preferred terms were those that used "plant-based" or "plant protein."

At present, a variety of labels are used in the marketplace to indicate that a product contains no animal ingredients (e.g., "plant-based," "vegan," "meat-free," "meatless"). Further clarity is needed regarding the outcomes associated with these labels (Wise, Venard, & Bacon, 2018). As shown in the reviewed literature, studies varied in terms of tested outcome variables and methodological approach, which in part contributed to the lack of consistency among study findings. On balance, however, the research indicates that "plant-based" and "plant protein" are both more appealing than "vegan" or "meatless." Continued research on this topic would lend greater clarity to implementation recommendations, and we especially recommend research studies that employ experimental designs and test behavioral outcome variables in an ecologically valid setting. At present, our recommendation is to use "plant protein" or "plant-based" as a category descriptor.

Product Packaging

Currently, only one study has specifically examined the appeal of plant-based product packages in order to provide packaging recommendations. Parry and Mitchell's (2019) online implicit study exposed participants to one product-package image at a time. Under each image was a word (e.g., "appealing"), and participants were asked whether they felt the word described the image. Overall, these product associations revealed a pattern. Essentially, the packaging of products that participants most commonly felt could be described as tasty or delicious often showed the product itself (e.g., the package did not cover the entire product or showed a picture of the product) and resembled meat packaging. Dark or brown boxes and pouches scored highest on these attributes: taste, health, nutrition, naturalness, environmental friendliness, and plant-based status. Product packaging that participants consistently did not rate as tasty or delicious usually included cans or the color red. While these trends existed in the product purchase intent data, companies must test specific package design.

Practical Applications

Nudges may help tip the scales in favor of selecting plant-based meat (Cecchini & Warin, 2016; Grankvist et al., 2004; Hoek et al., 2017). However, the product will need to meet taste and other sensory expectations and be price-competitive, convenient to purchase and prepare, and familiar to consumers (e.g., Hoek et al., 2017; Vanclay et al., 2011). While health and environmental impact might be important to certain consumer segments, these concerns may easily be overridden by other factors, such as taste expectations and visceral or affective cues of other choices (Campbell-Arvai et al., 2014; Hoek et al., 2017; Parry & Mitchell, 2019; Vanclay et al.,

2011). Health concerns tend to be a stronger driver of purchasing behavior than environmental concerns (Deloitte, 2016; Parry & Mitchell, 2019; Neff et al., 2018). Although not as strong a motivator as attributes such as taste, tradition, and freshness, health and environmental messages have been shown to be slightly helpful, with no backfire effects (Parry & Mitchell, 2019).

Additionally, the literature suggests that positive or inclusive labels are generally more effective than negative or deprivation framing, such as "plant-based" instead of "meatless" (Bacon et al., 2018; The Good Food Institute, 2016; Parry & Mitchell, 2019; Szejda, 2019). Health labels should appeal to the high protein or fiber content of plant-based meat but steer clear of negatively framed restrictive labels, such as "low fat" or "dairy-free" (Parry & Mitchell, 2019).

Because of the large, nationally representative sample and implicit testing method, Parry and Mitchell's (2019) labeling results provide impactful insight for labeling nudges. First, marketers of plant-based meat should consider using "plant-based" or "plant protein" as a category descriptor rather than using "meatless," "meat-free," "vegan," or "vegetarian." A plant-based patty was less popular when labeled "meat alternative," "meat substitute," "veggie beef," or "beefless patty." On the other hand, "plant protein" and "all-American" labels were more effective for the majority of U.S. consumers—an "all-American plant protein patty." Lastly, this study demonstrates that consumers' purchase intent increases when certain health benefits of a product are highlighted, particularly those relating to high protein. These findings are generally consistent across dietary habits and age groups.

Plant-based meat products are more often rated as delicious or tasty when their packaging shows a high-quality photograph of the product or displays the actual product itself and uses brown or dark boxes or pouches (Parry & Mitchell, 2019). These types of packaging should be considered to increase consumer adoption of plant-based meat.

Future Research Directions - Labeling and Packaging

Research suggests that consumers' food choices are influenced by a number of factors, such as taste, familiarity, freshness, price, convenience, health, and the environment (e.g., International Food Information Council, 2018; Parry & Mitchell, 2019; see Working Paper 1). Although health and environmental concerns may not be the *primary* motivators in food choice, they are nonetheless desirable product attributes for a large set of consumers, particularly those segments already reducing meat consumption or those who are open to eating plant-based or cultivated meat (Parry & Mitchell, 2019). Labeling that highlights environmental and health benefits is a fairly easy intervention to implement when targeting these segments, especially compared with many resource-intensive interventions. Messages should be carefully crafted and tested to determine their effectiveness and potential for generating unintended consequences. We outline a number of suggestions below.

First, on the basis of existing literature, we must explore how descriptive language influences purchase of plant-based meat. Research indicates that environmental and health labeling may have only a small effect in the context of food purchases. Once plant-based products meet consumers' current expectations (see Working Paper 3) and address the core drivers of food choice (see Working Paper 1), further research should explore the degree to which health and environmental labels are persuasive when applied specifically to plant-based meat products.

However, while health and sustainability have both been identified as motivators for food choice, health has been shown to be more motivating than environmental impact (Deloitte, 2016; Neff et al., 2018). This pattern is also

evident in product labeling studies, as Parry and Mitchell (2019) found that high protein and high fiber were both highly rated in terms of attribute importance and sustainability was moderately rated in terms of attribute importance. To target the larger segments, research should foremost prioritize exploring and testing the effectiveness of taste cues, followed by health labels rather than environmental labels. In an ecologically valid setting, these labels could be implemented and tested in a variety of ways, such as on the package, as a leaflet inside the package, or on signs that consumers pass by.

Research should continue to evaluate the outcomes associated with the terms currently used to describe plant-based products: "vegan," "vegetarian," "plant-based," "plant-based protein," "plant-powered," "100% plants," "meatless," and "meat-free." Transparency with consumers requires that the plant-based nature of these products be communicated. However, as previous research has uncovered (Anderson, 2019; Wise & Vennard, 2019; The Good Food Institute, 2016; Parry & Mitchell, 2019; Szejda, 2019), none of these terms significantly outperforms all the others in every study. In comparisons of traditional labels ("vegan," "plant-based," "meatless"), "plant-based" usually outperforms "vegan" (The Good Food Institute, 2016; Parry & Mitchell, 2019; Szejda, 2019) but not in all studies (Anderson, 2019). "Plant protein" has also performed well (Parry & Mitchell, 2019; Szejda, 2019). Future research should continue to test existing descriptor terms as well as explore and identify new ones. Additionally, research should examine the impact of adding the small green-leaf label, which is often used to indicate a vegetarian or vegan product. It should also study the effect of the type of label (e.g., traffic light, informational).

Because protein is such a key attribute in conventional and plant-based meat consumption (see Working Paper 3) and because protein labels increased consumer intent to purchase plant-based meat in an online experiment (Parry & Mitchell, 2019), testing high-protein labels on packages or on product signage would be useful. Tests could incorporate variations of a high-protein label (e.g., "plant-based protein," "plant protein," "vegan protein").

All of these proposed studies must be understood in the context of current consumption habits. We must explore the way that the health labels, environmental labels, and plant-based category descriptors may influence consumers differently on the basis of their current attitudes toward plant-based meat and their meat consumption habits.

Menu Design

Menu-design interventions refer to a multitude of menu components, including nutritional and caloric information, which items appear on the menu and in which order, submenus within larger menus, menu item descriptions, conventional meat or other protein options, and add-on options.

Synthesis of Research Findings

Providing Caloric Information

Some studies have examined the potential for information labeling on menus (e.g., caloric information) to influence meal selection. A systematic review and meta-analysis conducted by Sinclair, Cooper, and Mansfield (2014) explored the potential for calorie labeling to encourage selection of lower-calorie meals. Across 17 studies, calorie labeling alone on menus did not affect calorie consumption. However, added contextual or interpretative nutritional information, such as recommended calorie intake or traffic light labeling, did reduce calorie consumption.

Providing Default Meal Components

"Defaults" are options that are implemented if a person takes no action. However, defaults are not binding, in that they are not implemented if a person chooses an alternative. For example, unless ordered with plant-based meat or beef, a salad may automatically come with chicken breast as its protein. Default options are similar to the above-described "opt-out" employee pension program, as they often steer outcomes because people tend to avoid the mental and sometimes physical effort involved in decision-making. Additionally, default options may provide an implicit recommendation (i.e., that the default is the best option in a given scenario).

In the context of food choice, van Kleef, Siejdell, Vingerhoeds, Wijk, and van Trijp (2018) found that people commonly retained default bread choices when ordering a sandwich. Even when informed that the default bread choice could be switched for the alternative, 94% of participants retained the default wheat bread for a sandwich, and 80% retained the default white bread, demonstrating the persuasive nature of defaults. The type of sandwich moderated this effect. People were more likely to retain the wheat bread when having a healthy sandwich (100%) and less likely to retain it when having an unhealthy sandwich (88%). This highlights the interaction between meal context (e.g., healthfulness) and retainment of default menu items. Given an appropriate meal choice, consumers may similarly be more likely to retain plant-based meat as the default choice in certain dishes.

Providing an Entire Vegetarian Menu by Default

A number of studies have explored the impact of providing an entire default menu with the opportunity for customers to request or seek out alternatives. Gravert and Kurz (2017) investigated the topic with respect to consumer selection of vegetarian meals. In the experiment, two different menus were provided in a restaurant, and customers were randomly assigned one of the menus. One menu contained meat and fish dishes along with a printed note that a vegetarian option was available upon request. The second menu contained vegetarian and fish dishes along with a printed note that a meat option was available upon request. All meals were the same price and served with the same side dishes. The sales data among meat, fish, and vegetarian meals before, during, and after the intervention revealed an increase in vegetarian meal selection during the intervention compared with before and after the intervention. Over the entire experimental period, of those who received the vegetarian-fish menu, 15% purchased vegetarian dishes, and of those who received the meat-fish menu, only 3% purchased vegetarian dishes. This experiment underscores the effectiveness of default vegetarian menus in influencing consumer choices in the restaurant setting. Although implementation of such an intervention is unlikely to be feasible in most restaurant settings, offering plant-based meat by default in specific menu items could be tested.

Campbell-Arvai, Arvai, and Kalof (2014) conducted a similar experiment assessing the role of appealing or unappealing menu items, vegetarian or conventional menus, and environmental labels or no labels. Appealing menu items were determined through a pilot test in which college students rated 22 existing vegetarian and vegan menu items, resulting in five menu options with the highest mean semantic differential scores (e.g., three cheese lasagna) and five items with the lowest mean scores (e.g., vegan calzone, vegetarian sloppy Joe sandwich). Combinations of the aforementioned variables resulted in eight experimental menus randomly given to each of the 319 participants. The default vegetarian menu condition provided study participants with a vegetarian menu and the option of viewing additional choices (although viewing alternatives involved the significant effort of getting up, walking 10 feet across the room, and accessing another menu). Having controlled for all other variables, the researchers discovered the following: (1) the default vegetarian menu achieved significantly greater selection of vegetarian items than did the control menu, and (2) the appealing menu achieved significantly greater selection of vegetarian items than did the unappealing menu. The environmental

logo (a small leaf) and accompanying text (which informed that a menu item did not contain meat and was thus better for the environment) did not significantly predict selection of a vegetarian item (they were neither helpful nor harmful). This indicates that reducing the accessibility of conventional meat or increasing the accessibility of plant-based meat could help reduce consumption of conventional meat. Plant-based meals should be carefully pretested for general appeal. Lastly, the pilot test findings indicate that lack of familiarity with plant-based meat products may influence ratings of menu items containing plant-based meat (e.g., vegetarian sloppy Joe).

Both studies strongly manipulated the default choice, requiring participants to expend considerable effort to opt for a non-default choice. The studies did not assess the potential impact such a strong intervention might have on overall consumer satisfaction and, ultimately, a restaurant's long-term sales. Employed default interventions typically do not involve such great inconvenience in selecting an alternative. While the outcomes in these two studies are noteworthy, additional testing of more-realistic, subtle menu interventions, as well as their long-term impact on restaurant visits, would be useful.

Increasing Availability

Another promising choice architecture intervention is increasing the proportion of vegetarian menu items. In a university cafeteria setting, Garnett et al. (2019) examined the causal effect of increasing availability of vegetarian and vegan meals at lunchtime. The researchers accessed anonymized individual-level sales data as an observed measure of behavior change. In the experiment, cafeterias altered the meal options every two weeks such that the control group lunch menu included one vegetarian meal in a total of four offerings. The intervention group lunch menu included two vegetarian meals in a total of four offerings. This doubling of vegetarian meal availability increased vegetarian sales from 19.1% to 26.9% of total sales. The effect applied to all meat consumption patterns but was most effective on individuals who normally ate the most meat meals. Vegetarian availability alone (a measure of the sole impact without other factors, such as price or day of the week) explained 3.9% of the variance in sales of vegetarian meals. Results also indicated that the availability intervention did not cause unintended consequences: Total sales did not change; nor did the number of meat meals at dinnertime.

Using Menu Item Descriptions

The words used to describe menu items can also influence food selection—for example, "chef's recommendation" and words that describe provenance, such as "local" and "seasonal"; words that describe freshness, flavor, or texture (often referred to as "indulgent" and oppositional to "healthy" in the literature); or words that describe the health aspects of a meal. The two studies described below specifically targeted vegetarian choices and tested numerous meal descriptions as interventions.

Bacon and Krpan (2018) conducted an online survey to examine how different types of menu descriptions influenced vegetarian food choices. Participants were shown one of a number of menus that differed in certain ways. Specifically, the presentation of a vegetarian item (a risotto dish) varied systematically. The first condition was a control condition that simply called the option a risotto. The second condition presented the risotto using descriptive, appealing language, such as "fresh" and "seasonal." The third condition pointed out that the risotto was the "chef's recommendation." The fourth and final condition placed the risotto in a separate vegetarian section of the menu with the control description. As was the risotto, all other menu items in the control group were listed without descriptive language. The descriptive language and chef's recommendation conditions both increased the likelihood of selecting the vegetarian option among those who infrequently ate vegetarian food. However, these interventions decreased the likelihood of selecting the vegetarian option among those who frequently ate vegetarian food. Notably, the condition with the vegetarian menu section made these frequent consumers less likely to order the dish. These results demonstrate how various interventions can influence

certain demographics differently. Such heterogeneity should be considered when designing and testing food-choice interventions.

In their two-part exploratory online study of menu item names, Vennard, Park, and Attwood (2019) tested eight to nine different names for each of six plant-based dishes from four different companies. Control names were also tested ("vegetable lasagna," "black bean burger," "gnocchi," "jerk butternut squash," "veggie burger," "chickpea and potato curry," "meat-free breakfast," and "meat-free sausage and mash"). For the meat-free breakfast, "feel good breakfast," "garden breakfast," "super value breakfast," and "field-grown breakfast" all performed significantly better than the control name, and "field-grown" performed best at 93% better than the control. "Cumberland spiced sausage and mash," "better sausage and mash," and "field-grown sausage and mash" all performed better than the control. Overall, the authors concluded that language that communicates the experience and enjoyment of the food performs best and should be utilized (e.g., "melt in the mouth," "comforting").

Next, Bacon, Wise, Attwood, and Vennard (2018) tested these findings in a real-store setting. The authors partnered with the U.K. grocery chain Sainsbury's to test various descriptions of vegetarian menu items in store cafes over an eight-week period. Effectiveness of these descriptions was determined by sales increases of each item at 10 experimental cafe locations and 18 control locations. Original dish names simply described the items' lack of meat, while experimental manipulations highlighted ingredients' geographical origins (e.g., "Cumberland-spiced"), used positive descriptors (e.g., "feel good"), or utilized more-positive plant-based descriptors (e.g., "field-grown"). Compared with the control group, sales of the item originally named "meat-free breakfast" increased significantly when the item was renamed "garden breakfast" (12%) and "field-grown breakfast" (18%) but did not increase significantly when the item was renamed "feel-good fry up." When the item originally named "vegetarian sausages and mash" was renamed "field-grown sausages and mash" and "Cumberland-spiced veggie sausages and mash," sales increased 51% and 76%, respectively. After further analyses, the authors found that changing these names increased the overall proportion of individuals ordering vegetarian items, although not with statistical significance. It should be noted that in each condition the name had a V symbol next to it on the menu. These results were identified in an ecologically valid setting and indicate that menu item names can profoundly influence consumer purchasing behavior. Labels that highlighted product origin or positively perceived plant-related descriptors (e.g., "field-grown," "garden") were especially effective. Overall, the Better Buying Lab suggests that promoters of plant-based foods omit healthy restrictive labeling and descriptors such as "meat-free," "vegetarian," and "vegan" (Wise & Vennard, 2019).

Turnwald, Boles, and Crum (2017) tested descriptive language in a lunch cafeteria. The authors tested two types of menu item descriptions of vegetables: health descriptions and indulgent (taste-forward) descriptions. Vegetable dishes (i.e., green beans, carrots, or sweet potatoes) were each described in one of four ways: basic (e.g., "green beans"), healthy restrictive (e.g., "light 'n' low-carb green beans and shallots"), healthy positive (e.g., "healthy energy-boosting green beans and shallots"), or indulgent (e.g., "sweet sizzlin' green beans and crispy shallots"). Overall, indulgent labeling resulted in significantly greater selection of vegetables (221 indulgent-labeled meals on average) compared with the other conditions (177 basic, 164 healthy positive, and 157 healthy restrictive on average). Similar results were found for the volume of vegetables consumed; that is to say, the indulgent condition resulted in greater consumption than all other conditions. The non-indulgent conditions did not differ significantly from one another. These results suggest that testing the effects of indulgent labeling in the context of plant-based meat is a promising area for future research. It is important to note that since the health conditions and the basic condition did not differ from each other statistically, the results did not suggest a harmful effect of using health messages. Moreover, this was despite the fairly bland taste connotations of the health messages (e.g., "reduced sodium corn" and "vitamin rich corn"). While this study highlights the effectiveness of indulgent descriptions for menu items, we should cautiously apply the results of a study on

vegetables (universally known to be very healthy) to the context of plant-based meat. Additionally, when designing health messages, it is important not to inadvertently communicate bland taste. Certain types of health messages have been found to be more effective than others in the context of plant-based meat consumption: healthy positive framing in general and high protein in particular (Parry & Mitchell, 2019).

Practical Applications

Utilizing theories that incorporate human decision-making processes will shed light on choice architecture interventions that may serve to increase consumer adoption of plant-based meat. Providing nutritional information with appropriate contextual cues, adjusting menu item descriptions, and altering menus to make plant-based and meat-free items the default are all likely to increase plant-based meat consumption.

Notably, the approaches that make choosing meat options less convenient for the consumer (e.g., requiring physical movement) appear to be the most effective but are also the least likely to be implemented by restaurants or supermarkets. Softer interventions that make choosing plant-based options easier and choosing meat options more difficult will also probably have a positive, although less dramatic, effect. Interventions more likely to be implemented, such as placing plant-based items first or last on a menu, could be effective as both experimental and real-world settings have shown (Dayan & Bar-Hillel, 2011). However, restaurants and supermarkets will need incentive to make such changes.

Altering menu design by adjusting the information provided appears to yield mixed findings. There is some, albeit limited, evidence for the effectiveness of nutritional information on menus in reducing calorie consumption (Sinclair et al., 2014). The effectiveness of nutritional information is bolstered with the addition of interpretative information (Cecchini & Warin, 2016; Grankvist et al., 2004). In other studies, descriptive labeling appeared to be effective (Bacon & Krpan, 2018; Turnwald et al., 2017). Positively framed words (such as indulgent descriptions) increased willingness to consume vegetables (Turnwald et al., 2017). Although promising, this finding has not been replicated in the context of plant-based meat.

Future Research Directions

More research is needed to understand the effect of menu design. In particular, the impact of menu-design changes on consumer perceptions of a restaurant and on consumption of plant-based meat can help us understand what will incentivize restaurateurs to take actions that will drive plant-based meat consumption.

Menu design appears to affect individuals differently according to their current meat consumption. Future studies should further explore this interaction to determine when and for whom certain approaches are helpful or harmful. Additionally, interventions could be carefully designed to enhance selection among multiple consumer segments. For instance, an integrated menu that also uses small indicators (e.g., green leaf, V symbol) has the potential to increase consumption while meeting the needs of traditional meat consumers, flexitarians, vegetarians, and vegans.

Descriptive or indulgent language increases consumption and sales of vegetarian food (Turnwald et al., 2017; Bacon et al., 2018), as it cues consumers' food-choice drivers of taste and familiarity. In fact, it has already effectively increased sales of veggie sausage in a cafe setting (Bacon et al., 2017). Future research should examine the influence of descriptive or indulgent labeling on plant-based meat purchasing in the grocery store setting as well. In particular, future research should focus on whether effects exist for plant-based meat and the degree to which one's meat consumption or attitudes toward meat consumption moderate these effects.

Additionally, research should examine the role of menu-design structure, availability of more plant-based offerings, and descriptive text and labels around plant-based meat options on menus. Menu-design structure can increase selection of plant-based meat through default choices, a chef's recommendation box, an integrated menu, or placement of plant-based meat dishes first or last on a menu. Menu descriptions are also a promising area of research. Studies should explore the use of indulgent descriptive text and healthy positive descriptive text and logos. Contextual factors, such as individual levels of meat consumption and food context (e.g., fast-food counter, sit-down restaurant, buffet), should also be explored.

Combined Approaches

Some research has simultaneously employed multiple interventions to influence behavior. For example, one study applied nutritional labeling and placed healthy products in high-traffic areas in a cafeteria (Thorndike, Riis, Sonnenberg, & Levy, 2014). In a research setting, combining approaches has the potential advantage of creating a larger impact, but the disadvantage of this approach is that it sheds light only on the effect of the intervention as a whole and not the individual components.

Synthesis of Research Findings

Ensaff et al. (2015) employed a combination of nudge strategies to influence the consumption of vegetarian choices in a school cafeteria. The interventions included adding several types of stickers to different vegetarian items (e.g., "today's special," "good for you," smiley faces), placing posters on the wall, and positioning the food in prominent places. A control school received none of these interventions. Data were collected from both schools for the academic years prior, during, and after the interventions. Children at the experimental school ate more healthily during the intervention year than they did in the years before and after it. No such differences were found for the control school. Specifically, children ate more fruit and were more likely to select vegetarian meals and sandwiches with salad. Selection of the promoted plant-based options increased during the interventions, although it is important to note that the increase was small.

Having controlled for outside social and cohort factors, the researchers found that students were more likely to select a promoted item during the intervention year than in the previous year (from a baseline of 1.4% of all choices being plant-based before the interventions to 3.0% during and 2.2% afterwards). Moreover, students were three times as likely to select a fruit, vegetable, or salad item during the interventions, even those not directly promoted by an intervention. This spillover effect also influenced salad choice, with students seven times as likely to select a salad item during the interventions than at baseline. Although the overall impact of the interventions was low, the findings demonstrate the potential for increasing the impact of nudges by applying them multiply at a large scale.

Thorndike et al. (2014) conducted a similar set of interventions in a hospital cafeteria. The first was traffic light labeling applied to products according to their degree of healthiness. A second intervention, implemented later, involved placing healthy products in more-accessible places. Sales were monitored every three months for two years. Results showed that for all cafeteria purchases, the purchasing of unhealthy (red) items decreased from 24% to 21% for the first year, and this approximate 3% decrease persisted for the second year. The purchase of healthy (green) items increased from 41% to 45% for the first year and increased to 46% for the second year. This was the first study to explore the long-term effects of health food nudges and the maintenance of behavior change. However, since the experiment lacked a control group, its findings should be interpreted with caution.

Wisdom, Downs, and Loewenstein (2010) explored how nudges affected healthy choices in a fast-food setting. Participants were incentivized to complete a survey for a free meal. The researchers manipulated participants' receipt of either caloric information about the meal or information regarding recommended daily caloric intake. They did so by asking participants to either check an item from the healthy default menu or open a sealed non-default menu, which held fewer healthy sandwich options, and write out their selections. Results showed that providing caloric information either about the meal or about the recommended daily intake reduced overall calorie consumption. However, the latter did not reduce caloric intake for overweight people. Additionally, forcing participants to open a sealed unhealthy menu reduced overall calorie intake. Forcing participants to write out their orders decreased unhealthy sandwich choice but not overall caloric consumption. The findings provide some additional support for use of labeling and default menus to influence healthy choices, although more feasible default interventions should be considered to test applicability in real-life restaurant settings.

Practical Applications

These studies provide evidence, although limited, for the potential of combined approaches to increase impact in nudge designs. Placing vegetarian and plant-based meat options in convenient locations alongside descriptive or informational labeling may increase consumption of such products. Alternatively, vegetarian default menus, although less feasible, may be an impactful way to reduce traditional meat consumption.

Future Research Directions

As noted, combined interventions preclude an understanding of the influence of specific interventions. However, they are often implemented in real-life settings. Currently, combined approaches have not directly tested selection of plant-based meat. Future research should do so. Once research has explored which individual nudges are effective, exploring combinations of nudges would be valuable. These may include a combination of location, default menus and menu items, and labeling. Moreover, exploring how the effectiveness of these combinations varies according to setting (e.g., cafeteria, restaurant, supermarket, cafe) is important.

Choice Architecture Approach Summary

Choice architecture provides an implementable avenue for influencing dietary choices. Although the impact of a "nudge" is relatively small at an individual level, a nudge can have considerable impact when applied widely. Three types of nudges have been explored: product location, product labeling, and menu design. Only a few reviewed studies have directly tested nudge interventions to influence plant-based food consumption (Bacon et al., 2018; Parry & Mitchell, 2019; Vennard et al., 2018), and only one of these tested nudge interventions in an ecologically valid setting (Vennard et al., 2018). The literature suggests that such interventions have great potential to increase consumer adoption of plant-based meat.

Placing products in high-visibility and high-traffic areas is effective at encouraging their selection (Engell et al., 1996; Kerr et al., 2012; Kongsbak et al., 2016; Levitz, 1976). Additionally, placing products in the mainstream section of their respective categories, versus in niche segregated sets, has been shown to nudge consumers to purchase these products and increase sales in the dairy and organic food categories: Plant-based milk is now consistently shelved adjacent to conventional cow's milk, and organic products are now largely integrated alongside conventional options. However, retailers have only recently begun placing plant-based meat alongside conventional meat, thus creating a comparison between the products with visceral cues present in the immediate purchasing context. We do not have exhaustive results as to the effectiveness of this strategy, but early results—along with indicators from other product categories—suggest that this is an effective strategy.

Adding health or environmental labels to products is also effective (Grankvist et al., 2004; Hoek et al., 2017; Parry & Mitchell, 2019; Vanclay et al., 2011). However, this effectiveness appears to be limited by other contextual factors, such as price (Hoek et al., 2017; Vanclay et al., 2011). Therefore, this strategy probably works well only in conjunction with other strategies.

Research is mixed regarding meat consumers' preferred terminology for the plant-based category—"vegan," "plant-based," "meat-free," and so on (Anderson, 2019; Parry & Mitchell, 2019; Szejda, 2019; The Good Food Institute, 2016; Watson, 2018). In most studies, consumers consciously rate "plant-based" higher than "vegan" in terms of appeal (Parry & Mitchell, 2019; Szejda, 2019; The Good Food Institute, 2016; Watson, 2018). However, a recent choice experiment found that "vegan" sounded the best (Anderson, 2019), and a recent randomized experiment found no statistically significant effect of any descriptors in terms of appeal, likelihood of trying, or purchase intent (Szejda, 2019). In any case, the influence of these descriptors varies according to consumer segment (Anderson, 2019). Overall, the majority of studies support the use of "plant-based" as the most effective category descriptor.

Finally, menu-design techniques are effective at increasing selection of plant-based food options (e.g., Sinclair et al., 2014; van Kleef et al., 2018). Default menu items increase selection, including of vegetarian and vegan options (Gravert & Kurz, 2017). However, these influences may vary for different kinds of consumers (Bacon & Krpan, 2018). Accordingly, all choice architecture interventions must indeed be sensitive to differences among consumer segments. More research is needed to understand these nuanced effects. No research to date has specifically explored the role of menu design or default menus on selection of plant-based meat.

Choice Architecture Recommendations

Because choice architecture can be applied in numerous settings (e.g., in a grocery store, online, in restaurants), these outlined tactics to influence consumer purchasing decisions are not limited to any specific target population segment. The likelihood of choosing plant-based options, including plant-based meat options, can be increased for each of the three main relevant consumer segments (traditional meat consumers, meat reducers, and vegetarians and vegans) through choice architecture methods. When more research sheds light on the impact of nudge type, nudge combinations, and the interactive effects with consumer type, more specific recommendations can be made.

Conclusion

Approaches involving choice architecture are realistic to implement and effective at increasing consumer adoption of plant-based meat in a purchasing environment, whether a restaurant, cafeteria, or grocery store. Theories that explain the effectiveness of choice architecture include System 1 / System 2 thinking and the Elaboration Likelihood Model. Choice architecture approaches include product location, product labeling and packaging, menu design, and combined approaches. Because these methods are already pervasive in the purchasing context, they can be designed to effectively influence the purchasing behavior of all three major consumer segments to increase adoption of plant-based meat.

CHAPTER 05: Messaging

Key Findings and Recommendations

Part I: Incorporate Key Elements of Effective Message Design

When preparing a marketing strategy, consider not only the content of the message but the message source, channel, target audience, and framing.

- **Message source:** The message source plays an important role in influencing consumer attitudes and openness to a message. This is especially true when a consumer makes a passive choice, such as quickly choosing food in the grocery store.

- **Communication channel:** The channel choice influences whether a message is seen. To reach a specific audience, message designers must find out to which communication media the target audience is most exposed.

- **Targeted messages:** Marketers should establish a consumer segmentation strategy to identify their target audiences. A market strategy's effectiveness in influencing consumers strongly depends on the preferences, habits, and behaviors of the target audience.

- **Framing:** Message designers should choose a benefit frame that will most widely appeal to their target audience's needs or wants. Framing a message as a narrative helps the target audience remember, think about, and like the product or idea. A message's effectiveness also depends on the degree to which it is tailored to a target population's beliefs and attitudes.

Part II: Use Tested Theory to Guide Design and Dissemination

Applying tested behavioral and social influence theories to message design and dissemination increases the likelihood of achieving desired behavioral outcomes.

- **Integrative Model:** An effective influence strategy utilizes (1) messages that appeal to the target consumers' attitudes toward eating plant-based meat, (2) messages that demonstrate to target consumers that most people similar to them eat plant-based meat, or (3) encouragement and instructions regarding preparation of plant-based meat.

- **Self-efficacy:** People's beliefs about their capability determine how they feel, think, motivate themselves, and behave. Messaging focused on providing easy-preparation instructions, including noted similarities to conventional meat preparation when applicable, may address this barrier.

- **Transtheoretical Model:** An effective way to develop targeted messages is to base them on consumers' stages of change. For example, "how-to" information about purchasing and preparation will help individuals who are contemplating change.

- **Theory of Planned Behavior:** An effective strategy for influencing behavior is to target three key variables: perceived social pressure, belief that the behavior is within one's control, and (especially) attitudes toward the behavior.

- **Social influence:** Social norms messaging is an especially promising area of influence and should be tested in the specific context of plant-based meat promotion and adoption. Socially constructed food norms may be a stronger predictor of food choice than one's own preferences, although this effect is strongest in collectivist cultures.

- **Types of social norms:** In the context of plant-based meat, descriptive norms (norms that describe current behavior) are likely to be more effective than injunctive norms (norms that describe important others' behavioral expectations).

- **Dynamic descriptive social norms:** Framing descriptive norms as dynamic (popularity has increased over time) or as dynamic with future growth (popularity has increased over time and is expected to increase even more) is an especially promising message content application to plant-based meat.

Part III: Focus message content on desirable product attributes and social norms

When designing messages to increase consumer adoption of plant-based meat, choose the message content most likely to drive purchasing. Desirable product attributes include taste and sensory appeal, familiarity, tradition, meal context, ease of preparation, and high protein content. Effective social norms include descriptive norms, such as dynamic and future-growth dynamic norms.

- **Taste and sensory appeal:** Message content related to taste will most strongly appeal to consumers, as taste is the most consistently reported motivation across all groups for product selection within the plant-based category.

- **Familiarity:** Traditional meat consumers and meat reducers tend to be more interested in foods that they find traditional, familiar, or comforting than in foods that they perceive as innovative or novel. Care should be taken to place novel foods in the realm of the familiar.

- **Convenience:** Messaging that describes plant-based meat as convenient and easy to prepare, suited to the broader meal context, and similar to conventional meat (where applicable) is likely to appeal to the widest audience.

- **Health benefits:** Messages about plant-based meat's health benefits should typically frame these benefits as a positive gain, not an absence of a negative. Because protein is both a highly desired core attribute of plant-based meat and a salient perceived barrier, high protein content should be the central point highlighted in health-focused marketing messages.

- **Altruistic benefits:** Altruistic benefits, such as environmental friendliness and animal welfare, are unlikely to significantly drive purchasing among traditional meat consumers. They are somewhat more effective for active meat reducers but still fall well below the other attributes.

- **Social norms:** The use of social norms to influence behavior is an especially promising message content application. The most compelling social norms are dynamic descriptive norms and future-growth dynamic norms.

Introduction

For entities that directly communicate to consumers in the general public, messaging—when well-executed—is a necessary and effective strategy for increasing consumer adoption of plant-based meat. This paper provides a synthesis of evidence-based messaging concepts and recommendations as well as suggested message content areas. First, we outline key message design concepts that are imperative to consider when communicating with consumers in general. One of these important considerations is the target audience. In Working Paper 2, we outline consumer segmentation findings and our recommendation to focus interventions on the early adopter and early majority segments, including flexitarians and traditional meat consumers rather than vegetarians. Second, we outline theoretical foundations with which to design messages in order to most effectively increase consumer adoption of plant-based meat and impact consumer behavior overall. These theories are useful for message design and dissemination, as they have been rigorously tested and can thus streamline the message design process and maximize the likelihood of desired outcomes. Lastly, we review and prioritize important content for messages, including desirable product attributes and descriptive social norms.

Part I: Message Design Concepts

With messages designed to increase consumer adoption of plant-based meat, several considerations beyond content may help or hinder the message's ability to influence an intended recipient. These considerations include targeting, message framing, channel choice, and message source. In order to contextualize and facilitate understanding of each consideration's function, we first explicate the Transactional Model of communication. Then we describe each messaging consideration and ideas for future research.

Transactional Model

The Transactional Model of communication provides the most basic understanding of the communication process (Shannon & Weaver, 1949; Schramm, 1954). Essentially, communication begins when a message source (or sender) decides to send meaning to a person by first choosing the appropriate symbols for encoding it (words or nonverbal signals) and the channel through which to send the intended meaning, such as a face-to-face or phone conversation or a letter or text. The recipient of the message (or receiver) perceives the message and breaks down the symbols to assign their own meaning (decoding). When a sender's intended meaning matches the receiver's interpreted meaning, both communicators have reached understanding.

Although a rudimentary model of human communication, the Transactional Model provides a necessary foundation from which to understand useful theories relating to message sending among individuals or entities.
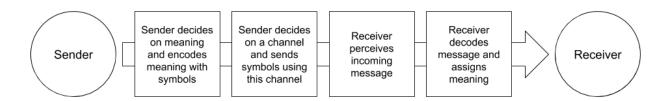

Figure 1. Model of a successful communication process that reaches understanding.

Message Source and Channels

Message Source

The person or entity that sends a message (i.e., the message sender) plays an important role in influencing consumer attitudes and should be carefully considered. This is especially true when a consumer is making a passive choice, such as quickly choosing food in the grocery store, instead of a careful, scrutinized choice. Choices of the latter type might involve a pros and cons list, for example (see Working Paper 2 for further information on passive and active decision-making; Kahneman, 2013; Petty & Cacioppo, 1986). In a meta-analysis of 114 articles that examined the effects of a message source on persuasive outcomes, such as subsequent behavior or reported attitudes, Wilson and Sherrell (1993) found that a message's source accounts for 9% of the variance in outcomes. Additionally, Wilson and Sherrell (1993) identified expertise as the most influential message source characteristic. In accordance with these seminal findings, when one believes a message source is an expert in the relevant field, one is likely to be persuaded by that source. For example, in the International Food Information Council's (2018) survey, the most-trusted sources for food-choice information were registered dietitians, healthcare professionals, health coaches, scientific studies, and fitness professionals.

While the above findings act as a general rule, message source preference and effectiveness may vary by message context and specific population segment. For example, individuals usually rate nonprofits as more credible for online health information than for-profit corporations (Pan, 2006). Additionally, in a study that examined from whom African Americans would most prefer to receive dietary information, respondents reported preferring someone who reminded them of a close friend (Della et al., 2016). Participants' overall second choice was a message source who reminded them of their grandmother, but this was truer in urban areas than in rural areas (Della et al., 2016). These examples underscore the care that should be taken when disseminating messages promoting plant-based meat, especially in connection with one's target audience. Promoters might ask themselves: "Who is my target audience, and who would they trust? To whom would my target audience be receptive, and who would rouse their enthusiasm about receiving food-choice recommendations?"

Findings on message source specific to plant-based meat products vary. In a study conducted among U.K. consumers of plant-based meat products, the majority of participants reported that they had received information about plant-based meat primarily from their social networks and media, including social media, websites, and TV, and less from meat-free campaigns (Apostolidis & McLeay, 2016a). Moreover, non-vegetarian U.K. consumers reported that social media and TV advertising played a positive role in changing their perception of Quorn as a food only for vegetarians to an alternative for all consumers (Apostolidis & McLeay, 2016a). Therefore, celebrity endorsements may be a useful tool for widely determining and changing social norms about plant-based meat in the U.K. and in cultures with similar values.

Consumer studies in recent years have highlighted from whom most individuals prefer to receive their food information. As cited, IFIC (2017) found that people most trust food information received from dietitians, healthcare professionals, health coaches, scientific research, and fitness professionals. Additionally, millennials tend to trust research articles and health websites and blogs (IFIC, 2017), and men are more likely than women to trust food information shared by family members and friends (IFIC, 2017). Since 2017, consumers have reported a higher trust in government agencies to provide them with food-related information, although they have identified doctors as the most trusted (IFIC, 2018). These findings are useful in choosing the message source to which a target audience will be most open according to its demographic information.

Channels

Communication channel choice—the medium through which one sends a message—is imperative to consider when seeking to influence consumers. In order to reach a specific audience, message designers must find out which communication media their audience uses most or to which communication media it is most exposed. Additionally, individuals find different communication methods more or less credible when considering food, health, and dietary information (IFIC, 2017). In a meta-analysis of persuasive communication, Wilson and Sherrell (1993) found that, in comparison with other media, oral face-to-face and video communication had the greatest effects on participant outcomes (i.e., behavior or reported attitudes), even more so than combination approaches that used both of these channels. Although the utility of specific communication channels may differ in more recent times, strategically choosing which communication channel to use with a target audience remains important. For example, attempts to reach a younger audience, such as millennials or Generation Z, will be more effective through social media (specifically Instagram and Facebook) or YouTube than through traditional television advertising (Bazilian, 2017; Vision Critical, 2016), as younger people tend to use YouTube, Instagram, and Facebook (1) more than their older counterparts do, and (2) more than they use traditional television.

Applications to Plant-Based Meat

Future studies should further explore the role of the message source, such as celebrities and exemplars that may resemble target audience members' friends or family; the role of the setting in which messages are sent, such as cafeterias, restaurants, and supermarkets; and the channel through which they are sent (i.e., medium) to determine their impact on consumer acceptance of plant-based meat. Specifically, researchers should examine varying media usages among consumer segments. Additionally, descriptive research might seek to identify how current flexitarians, vegetarians, and vegans first learned of their favorite plant-based meat brands, in order to test the effective reach of various channels among traditional meat consumers and flexitarians.

Targeted Messages

Overview

Plant-based meat promotional messages should be designed with a target audience in mind. This means that both message content and framing will be decided on and designed to appeal to a specific subset of consumers. When designers choose a target audience, they will increase message influence by considering culture, potential effectiveness of secondary targeting, and consumer segment receptivity to messages promoting plant-based meat.

Cultural norms constitute a key consideration in message targeting and design. Once received, messages are decoded not only in the context of individual beliefs but in the context of cultural norms. Acceptance of plant-based meat varies by location and culture (Bryant et al., 2019). Beyond targeting by dietary characteristics (traditional meat consumer, flexitarian, and vegetarian or vegan), targeted message design is most effective when it incorporates culture-specific considerations as well. Thus, great care should be taken to ensure that culture-specific benefits of or barriers to plant-based meat are sensitively addressed (Graça, 2016).

Another concept to consider is secondary targeting by which messages are directed to the "influential others" of a target audience's members. These auxiliary individuals exercise influence over members of the target audience, such as by purchasing their groceries or leading community opinion. Essentially, sometimes messages that seek to change the eating behavior of a specific group are more effective if targeted toward those who impact the

purchasing behaviors and food choices of that group. This type of targeting is especially useful in family situations. Messages can be disseminated through secondary targeting of household grocery purchasers, religious or community leaders, and advocacy groups—whoever has influence over the consumption behaviors of the target audience.

Primed for action, the ideal target audience for messages promoting plant-based meat adoption is the flexitarian (or meat reducer) segment (see Working Paper 2). Thus, message content that has been shown to specifically influence this segment should be used (see Part C). Over time, message designers will want to gently expand their reach to later adopters (see Working Paper 2) and make sure that message approaches do not increase resistance in the traditional meat consumer segment. Messages targeting flexitarians can even play a positive role in influencing awareness of, familiarity with, and social desirability of plant-based meat among traditional meat consumers. The Transtheoretical Model (delineated in Part C of this paper) provides more insight about targeting groups on the basis of their readiness for change.

Framing

Overview

Framing theory suggests that the context in which information is presented affects the audience's receptivity to and interpretation of that information (Goffman, 1974). For example, if a message about plant-based meat is presented in light of health (e.g., a health frame, such as high protein content), receivers of this message will think about and subsequently perceive plant-based meat differently than if the message were presented in an environmental or animal welfare frame. Framing is a useful strategy for message design; however, its effectiveness is dependent on determining a receptive target audience (Vainio, Irz, & Hartikainen, 2018).

Narrative Framing

Framing messages in story form has been shown to be effective in both science communication literature and persuasion research. Narrative communication helps audiences retain and recall new information (e.g., Graesser et al., 2002; Moore et al., 1999), as well as engages and persuades them (e.g., Green & Brock, 2000). Accordingly, embedding a message in a story will influence an audience to remember, think about, and like the message's product or idea. Stories should exemplify an underlying message. For example, if a message designer wants to promote the claim that plant-based meat is familiar, traditional, and similar to conventional meat, a story about a family who shares a holiday meal including plant-based meat will intrinsically carry this message. Such a story will more effectively engage an audience with plant-based meat's familiarity than a mere claim that plant-based meat is traditional and similar to conventional meat.

Prior Attitudes and Beliefs

An important consideration when deciding on a message frame is a target audience's attitudes toward a topic, as well as the degree to which audience members are primed to be aware of their own attitudes toward that topic. To be most effective, message designers should research a target audience's prior beliefs and attitudes about a product and then utilize these in message content choice and framing. In fact, the effectiveness of a message depends on the degree to which it is tailored to a target population's current beliefs and attitudes.

When an individual has already been thinking about and evaluating plant-based meat as a product, convincing claims that promote plant-based meat will be more effective. Therefore, messages that increase awareness of

plant-based meat may be effective in priming consumers for later receptivity to marketing messages. Fabrigar et al. (1998) highlighted the importance of previous attitudes and the strength of these attitudes in their test of cognitive processing. The authors prompted this cognitive processing (or thinking about a topic) by exposing participants to an argument that promoted vegetarianism. In order to influence one group of participants to be more "in touch with" their attitudes about vegetarianism, the authors asked this group about their beliefs about vegetarianism before exposure to the experiment's argument. In contrast, the other participants did not answer questions about vegetarianism before being exposed to the pro-vegetarian argument. Results indicated that participants thought more about the pro-vegetarian argument when their attitudes were more accessible (i.e., when they answered questions about vegetarianism beforehand). In order to capitalize on this finding, message designers promoting plant-based meat should aim to increase consumer awareness of the product to increase familiarity with it. This familiarity ensures that consumers both form and access their feelings and beliefs about the product. In turn, future promotional messages will be more effective because consumers have already thought about the product.

When targeting and tailoring messages, message designers should always consider target audiences' preexisting beliefs and attitudes about a product. In their study of 1,279 participants in Finland, Vainio, Irz, and Hartikainen (2018) tested five differently framed messages about substituting conventional meat with plant-based meat. The five frames were health; climate change; combined health and climate change; a refutational health frame, which debunked the argument that conventional meat is necessary for health; and a refutational climate change frame, which refuted the claim that food choice has no effect on the environment. The authors determined that the message frames were equally persuasive. However, the authors found that the participants who held positive beliefs about red meat—"meat believers"—were not likely to intend to reduce meat consumption or eat more plant-based meat after reading the framed messages, while those who held more negative beliefs about red meat—"meat skeptics"—were more likely to intend to reduce meat consumption or eat more plant-based meat after reading the framed messages. These findings highlight the importance of appropriate targeting in message frames: If an audience has strong preliminary negative beliefs about the promoted behavior, then framing is unlikely to make a difference. Messages should meet target audiences where they are.

Applications to Plant-Based Meat

Future research should further investigate how framing impacts one's openness to trying or purchasing plant-based meat. Future research should control for the impact of meat consumption status (Vainio, Irz, & Hartikainen, 2018). It should also examine how "negative" or "avoidant" messaging of conventional meat, such as "consuming animal meat increases cholesterol," impacts consumer decision-making in regard to plant-based meat compared with positive messaging of plant-based meat's benefits, such as "consuming plant-based meat is a heart-healthy choice." This may also be examined by testing the framing of plant-based meat as an expansive food choice rather than a restrictive one that "takes meat away" from consumers. Future research should also test the framing of benefits and barriers of plant-based meat.

Part I Conclusion - Message Design Concepts

When preparing to disseminate messages in any context, promoters of plant-based meat must research and incorporate these core components of message design. First, effective marketing will begin with an approach to segmenting consumers (see Working Paper 2) and identification of a target audience. Second, message designers should choose a frame, such as taste, cost, or health, that they believe will most widely appeal to their target audience's needs or wants. Third, they should carefully choose a message source and a message channel.

Is an Instagram ad featuring a figure who is representative of the target population best? Or would in-person coupon distribution at a grocery store entrance be more useful? The effectiveness of any method strongly depends on the preferences, habits, and behaviors of one's target audience.

Part II: Application of Behavioral and Social Influence Theories

The purpose of this section is to apply previous tests of theory and research findings to the promotion and adoption of plant-based meat. Previous research and supported theoretical foundations are valuable in ensuring that messages promoting plant-based meat are designed to most effectively influence consumers. The theories outlined exist as a result of rigorous testing and take the "guesswork" out of message design and dissemination. Empirically tested and supported theory delivers the foundation on which to build effective messages.

This section will be useful for those conducting research in the area of plant-based meat messages. Application of these theories ensures sound, reliable testing whereby context-specific elements related to plant-based meat are the variables actually tested. Furthermore, the theories will prove helpful for those in the process of designing messages about plant-based meat, as each theory details how specific variables should relate to one another in message design and dissemination. We will describe a foundational communication theory—the Integrative Model—before delineating other frameworks.

Behavioral Influence Theories

This section begins by outlining theories relevant to influencing an individual's behavior and follows with an overview of how they have already been applied and how we can test and use them. The following theoretical models focus on ways to understand and facilitate behavior change.

Integrative Model

The Integrative Model provides the most comprehensive understanding of the multitude of variables that influence behavior (Fishbein & Cappella, 2006). The model is easiest to understand by beginning at the end—target behavior (i.e., substituting plant-based meat for conventional meat) in the last column of Figure 2 below—and working backwards. Essentially, in order to influence behavior, communicators should seek to influence an individual's *intention* to engage in that behavior (see next column in Figure 2). Additionally, plant-based meat interventions should consider adjusting environmental constraints to render it easy for consumers to engage in the behavior. Useful examples of this are stocking products in conventional grocery stores rather than specialty stores, placing plant-based meat adjacent to conventional meat, providing product coupons, or lowering the product cost. Similarly, by making food preparation as familiar as possible or including on-package and online preparation instructions that are easy to access and execute, plant-based meat marketing efforts will ensure consumers have the skills and abilities needed to engage in that behavior.
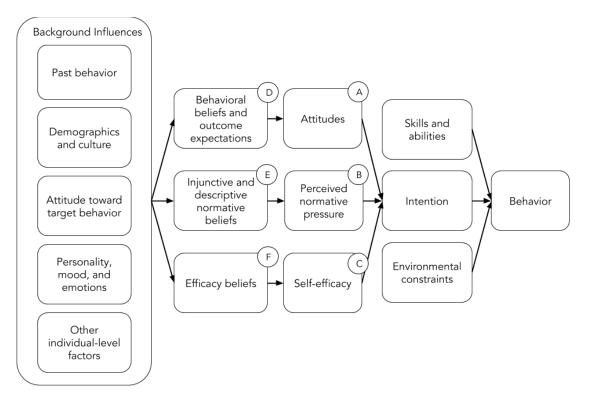
Figure 2. Integrative model of behavior change. Adapted from Fishbein and Cappella's (2006) Integrative Model.

Further, in the current context, the model posits that intention to purchase plant-based meat is influenced by the following:

    (a) attitudes toward that behavior
    (b) perceptions of normative pressure about that behavior
    (c) perceptions of ability to execute that behavior

This suggests that an effective influence strategy would utilize (1) messages that appeal to the target consumers' attitudes, (2) messages that demonstrate that most people similar to the target consumers choose to eat plant-based meat (see below section on social norms), or (3) encouragement and instructions regarding preparation of plant-based meat.

However, the constructs that influence intention to eat plant-based meat (attitudes, normative beliefs, and self-efficacy) are each respectively influenced by three preceding constructs:

    (d) target consumers' beliefs about whether engaging in the behavior will result in the desired outcome (behavioral beliefs and outcome evaluation)
    (e) target consumers' beliefs about whether the majority, including important others—that is, others who affect their perceptions of what is normal, such as friends, peers, and loved ones—engages in the behavior (injunctive and descriptive normative beliefs)
    (f) target consumers' perceptions of their control over their behavior (efficacy beliefs)

Messages may seek to (1) provide evidence for or testimonies to the achievement of a desired outcome (e.g., better taste, health) by countless others as a result of consuming plant-based meat; (2) both provide statistics showing how many people are eating plant-based meat and persuade consumers that important others think it is the better choice; and (3) remind consumers that plant-based meat is easy to prepare and delicious, requiring very little behavior change. All three preceding constructs are influenced by background factors specific to each

individual, including previous behavior, culture, current attitudes, and personality traits. Herein lies the importance of demographic segmentation, as these background influences will differ vastly across population segments.

As the Integrative Model explicates, effectively influencing an individual's decision to purchase plant-based meat is much more complex than simply explaining the product's health benefits or low cost. A host of factors influences an individual's journey to behavior change. The Integrative Model provides communicators with a map for intervening along the behavior change path. Researchers can use the model to identify existing gaps so that message design research can address them. For example, is normative pressure to consume plant-based meat missing in a certain demographic segment? If so, researchers can test normative messages' effectiveness in this particular segment. Additionally, with this model, marketers can decide which of the primary constructs that influence intention they would like to tackle. For example, if a marketing campaign's goal is to increase awareness and adoption of plant-based meat, then messaging should address changing attitudes toward and current normative beliefs about plant-based meat. Again, messaging tactics will vary according to background influences. In overview, the Integrative Model helps message designers (1) identify which construct to address with a message, and (2) integrate it with the background influences and constructs that precede it.

The Integrative Model provides an overarching framework for understanding the many factors that influence behavior change. In the following sections, we outline the research on and the applications of some specific components of the model, as well as summarize other foundational behavioral change theories.

Self-Efficacy

The concept of self-efficacy is foundational to many behavioral theories, including the Integrative Model. "Perceived self-efficacy" (also referred to as "perceived behavioral control" in the Theory of Planned Behavior and Theory of Reasoned Action) is defined as one's beliefs about one's own capability of attaining a designated performance level. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave (Bandura, 1994) and influence the types of activities and environments people choose. People avoid activities and situations that they believe exceed their coping capabilities but readily undertake challenging activities and situations that they judge themselves capable of handling. Additionally, self-efficacy is a theoretical construct that plays a crucial role in many of the below-delineated theories.

Applications to Plant-Based Meat

Self-efficacy strongly relates to plant-based meat consumption. In the meat reduction context, individuals often report the barrier of not knowing how to eat in alternative ways (Lea & Worsley, 2003; Pohjolainen et al., 2015). This finding has also been reported in studies examining plant-based meat consumption: Participants report not knowing how to prepare plant-based meat (Elzerman et al., 2013; Lea et al., 2005). In order to address this barrier, messaging should focus on providing easy-preparation instructions, including noted similarities to conventional meat preparation when applicable.

Transtheoretical Model

Overview

"Stages of change" are the core constructs of the Transtheoretical Model (Prochaska & DiClemente, 1983). According to this model, there are six of these stages:

Stage	Description
Precontemplation	Do not intend to engage in behavior in the next six months
Contemplation	Intend to engage in behavior in the next six months
Preparation	Taken steps to engage in behavior in the next month
Action	Changed behavior within the past six months
Maintenance	Maintained behavior for more than six months
Termination	Intend for behavior to be permanent

Consumers within each stage of change are most effectively reached by messages and interventions that are tailored specifically to their stage of change. Knowing how many individuals fall into each stage helps message designers target large populations. Researchers that examined anti-smoking campaigns, for instance, found that 40% of American smokers were in the precontemplation stage, 40% were in the contemplation stage, and 20% were in the preparation stage (Prochaska, Redding, & Evers, 2015).

Plant-based meat promotion strategies may also be tailored to these stages (Prochaska, Redding, & Evers, 2015). These strategies can be determined by first looking at the mental processes undergone within each stage (Prochaska, Redding, & Evers, 2004). The following recommendations are based on smoking cessation research conducted by Prochaska and DiClemente (1983) and a more recent study from Lee et al. (2017) in the context of nutrition and food-choice behavior changes in light of the Transtheoretical Model.

In the precontemplation stage, individuals process the least information related to changing their behavior, as they do not intend to make a change. However, when exposed to new information, these individuals may engage in consciousness-raising processes and environmental reevaluation (by which they consider the impact of a new behavior on their social and physical environments). When disseminating messages related to nutrition or food choice to those in the precontemplation stage, message designers will find it most useful to share new ideas (to incite consciousness raising), including the benefits of plant-based meat consumption and the negative consequences of conventional meat consumption. Additionally, messages should attempt to trigger environmental reevaluation by focusing, for example, on how important others will positively perceive consumption of plant-based meat.

Research has yet to identify the process by which an individual transitions from the precontemplation to the contemplation stage, so unfortunately, no recommendations for influencing the switch exist. Nonetheless, messages that stimulate consciousness raising are helpful in targeting individuals in the contemplation stage (those who are considering consuming plant-based meat). Another key mental process that occurs in the contemplation stage is self-reevaluation by which the individual is actually open to, considers, and responds to new information about the behavior. Messages should begin to incorporate how-to information, such as where to purchase plant-based meat and how to prepare it.

Messages targeting consumers in the preparation stage should continue to stimulate consciousness raising and environmental reevaluation. Additionally, messages should aim to increase perceptions of self-efficacy by encouraging consumers to believe that they are capable of making the change. For example, messages

promoting plant-based meat might inform consumers that anyone—regardless of skill level—can cook plant-based meat with ease.

Consumers in the action stage will benefit from all the above message types, as well as messages that provide recipes and more-detailed cooking instructions to increase perceptions of self-efficacy and messages that encourage consumers to seek social support from friends and family. During the action stage, individuals begin to experience the positive effects of the new behavior, and interventions should seek to reinforce the desired behavior. Cues to action, such as subtly placed advertisements and coupons, will encourage them to continue with the new behavior.

Applications to Plant-Based Meat

Targeted messages will help meat reduction interventions be more effective. One way to develop targeted messages is to base them on consumers' stages of change. In the context of consuming plant-based meat, Hoek et al. (2011a) found that the majority of consumers (57%) were in the precontemplation stage, and 41% were in either the action (38%) or the maintenance (3%) stage. Very few were in the contemplation or preparation stages. Consequently, the authors recategorized consumers in terms of non-users, light/medium users, and heavy users of plant-based meat. A future research opportunity is to conduct a national survey of meat consumption and intentions to eat plant-based meat similar to the meat reduction national survey conducted by Neff et al. (2018). However, a replication of this national survey should inquire about degree of plant-based meat consumption in addition to degree of conventional meat reduction. Such research will aid in determining which consumers to target and how best to target them.

Theory of Planned Behavior

Overview

The Theory of Planned Behavior (TPB) (Ajzen, 1985; Fishbein & Ajzen, 2010) has been successfully used to explain and predict a variety of health behaviors, including dietary change. The TPB states that intention to perform a behavior is influenced by three factors:

- Attitudes (how favorably or unfavorably a person feels toward the behavior)
- Subjective norms (perceived social pressure from important others, discussed later in this section)
- Perceived behavioral control (self-efficacy, or whether one believes the behavior is within one's control)

Actual behavior is determined by two factors: (1) behavioral intention, and (2) actual behavioral control. Behavioral control is conceptualized as a combination of self-efficacy (internal factors) and controllability (external factors). This further explains why intentions do not always lead to behavior change.
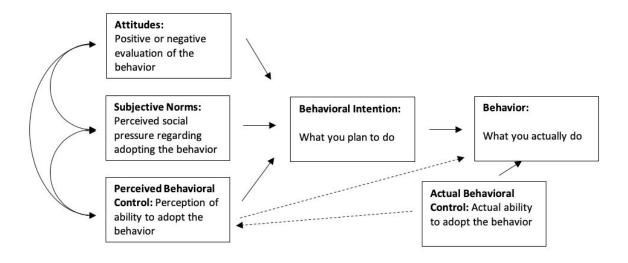
Figure 3. The Theory of Planned Behavior. Adapted from Fishbein and Ajzen (2010).

Applications to Plant-Based Meat

Many TPB studies related to food choice surround the topic of healthy eating and understanding how intentions to eat healthy impact ultimate food choice (McDermott et al., 2015). Two meta-analyses of dietary behaviors indicated that the TPB is a useful framework for understanding dietary behavior, as it has clear predictive ability (Riebl et al., 2015; McEachan et al., 2011). Riebl et al. (2015) conducted a meta-analysis of 34 articles and approximately 20,000 study participants and identified that the combination of attitudes, subjective norms, and perceived behavioral control explained 50%–60% of the variance in behavioral intentions. Intentions and perceived behavioral control together explained 6%–19% of the variance in actual behavior. The dietary behavior portion of McEachan et al.'s (2011) meta-analysis of 30 studies with over 9,000 participants found that the combination of attitudes, subjective norms, and perceived behavioral control explained 50% of the variance in behavioral intentions. Intentions and perceived behavioral control together explained 21% of the variance in actual behavior. These studies highlight the wide-reaching applicability of the TPB and the strong influence attitudes, social norms, and behavioral control have on behavior, especially in the context of food choice.

The TPB has also been successfully applied to meat reduction. Across several studies that tested the TPB in contexts related to meat reduction, attitudes were the strongest and most consistent predictor of intentions, while social norms and perceived behavioral control were less consistently predictive (Berndsen & van der Pligt, 2004; Graça et al., 2015a; Lentz et al., 2018; McCarthy, O'Reilly, Cotter, & de Boer, 2004; Povey et al., 2001; Wyker & Davison, 2010). Additionally, further TPB studies have identified the model's fit in predicting intention to reduce meat consumption (Szejda, Roberto, & Liu, 2017; Zur & Klöckner, 2014). Szejda, Roberto, and Liu (2017) identified a negative predictive relationship between intentions to reduce meat consumption and actual meat consumption, highlighting the realistic applicability of the TPB in this context. In other words, the more one intended to eat less conventional meat, the less conventional meat one reported eating. Furthermore, in accordance with the TPB, Zur and Klöckner (2014) found that self-reported meat consumption is positively predicted by meat consumption habits and negatively predicted by intention to reduce meat consumption. In other words, self-reported levels of meat consumption usually align with people's reported intention to eat less conventional meat, as well as their reported frequency of consumption. Previous meat consumption habits were

stronger in their predictiveness of meat consumption than were intentions to reduce meat consumption (Zur & Klöckner, 2014). The study also highlighted moral beliefs as a predictor of meat reduction, and moral beliefs were predicted by normative beliefs, perceived behavioral control, and health beliefs (Zur & Klöckner, 2014).

The meta-analyses, along with these studies in the specific context of meat consumption, suggest that the TPB is a useful theory for explaining and predicting behavior in general and meat reduction in particular. Thus, we expect TPB variables, particularly attitude formation but also social norms and behavioral control, to provide useful guidance for designing interventions to increase plant-based meat consumption.

Social Influence Theories

Social psychology theories consider how people's thoughts, feelings, and behaviors are influenced by the actual, imagined, or implied presence of others. Overall, this normative influence by others is referred to as social norms, and social norms play a strong role in food choice. For instance, Ruby and Heine (2012) suggest that socially constructed food norms may be a stronger predictor of food choice than one's own preferences, although this effect is stronger in collectivist cultures than in individualist cultures. Social influence theories can be used to design messages that effect change in eating behaviors. This section details normative theory, a prominent social influence tool.

Social Norms

Cues to Normative Behaviors

Appeals to normative behavior are proven useful interventions in influencing behavior. Social influence is a demonstrated powerful predictor of retail purchases (Gardete, 2015), particularly as they relate to meat consumption (Ruby & Heine, 2012). Research suggests that one's eating intentions are influenced by both the food that surrounding others eat and one's beliefs about the food that the majority of people eat (Croker, Whitaker, Cooke, & Wardle, 2009; Ruby & Heine, 2012; Sparkman & Walton, 2017). These intentions often convert into decisions via heuristics or decision-making shortcuts. For instance, observing everyone consume a certain quantity of food influences one to eat roughly the same amount. Cialdini (1993) similarly noted that positive heuristic attributes (or mental shortcuts) are useful for influencing nonrational decision-making. In fact, such heuristic attributes are among the most influential factors in food choice (Liu, Wisdom, Roberto, Liu, & Ubel, 2014). For example, Ruby and Heine's (2012) study identified friends' and families' meat consumption as a key significant predictor of meat consumption in India and Hong Kong. Additionally, social norms messaging has been successful in behavioral interventions, as it has reduced intention to eat conventional meat, for example (Berndsen & van der Pligt, 2004; Graça et al., 2015a; Lentz et al., 2018; Povey et al., 2001; Wyker & Davison, 2010). Therefore, social norms claims are likely to be effective in the context of plant-based meat adoption.

Social norms are usually categorized as either descriptive or injunctive (Cialdini, 2003). Descriptive norms describe people's behavior (e.g., "nine out of 10 teens wear a seatbelt") and have been found to influence behavior by showing that a specific behavior is indeed common ("what is"). On the other hand, injunctive norms describe what people *believe* other people important to them think they should do (e.g., "nine out of 10 teens believe their friends think that they should wear a seatbelt"; Cialdini, 2003). Injunctive norms communicate social approval ("what ought to be"). People tend to be influenced by both types of norms (Robinson, Thomas, Aveyard, & Higgs, 2014).

Synthesis of Research Findings

Dynamic Norms

Social norms have been tested as a theoretical construct in meat reduction studies using the TPB (Berndsen & van der Pligt, 2004; Graça et al., 2015a; Lentz et al., 2018; Povey et al., 2001; Szejda, Roberto, & Liu, 2017; Wyker & Davison, 2010). However, we are aware of only one study that has directly examined social norms as an intervention for reducing meat consumption. In a five-part experiment, Sparkman and Walton (2017) presented participants with one or the other of two variations of descriptive social norms messages: dynamic descriptive norms that showed that the norm had become more popular over time, such as "in the last four years . . . three in 10 people have changed their behavior and begun to eat less meat," and static descriptive norms that simply showed the status quo at the time, such as "three in 10 people eat less conventional meat than they otherwise would." The authors investigated the effects of these different descriptive norms using both an online experiment and an in-person experiment at a university cafe in the U.S. Both experiments showed that exposure to a dynamic norms message consistently resulted in a higher interest in reducing meat consumption (measured either as actual food purchasing or as reported personal interest in reducing meat consumption) than exposure to a static norms message. The authors also explored dynamic norms that conveyed expected growth: "This trend is expected to continue over the next five years." Exposure to this future-growth dynamic norms message resulted in significantly higher interest in reducing meat consumption compared with exposure to either the dynamic norms message or the static norms message.

Injunctive Norms

To date, we are not aware of any studies that examine whether injunctive norms (perceptions of what important others think should be done) influence people to consume plant-based meat or reduce their conventional meat consumption. However, several studies have successfully employed injunctive norms to reduce or increase other target behaviors, such as binge drinking among college students (Borsari & Carey, 2003) and littering in the general population (Cialdini, Reno, & Kallgren, 1990; Cialdini, 2003). But Mollen et al. (2013) found that injunctive norms did not significantly influence university students' eating behavior, while descriptive norms did. The authors argue that this might be because injunctive norms target universally held perceptions of how to behave, while descriptive norms vary with context. Accordingly, injunctive norms increase the salience of already-held beliefs, while descriptive norms change perceptions. In order to increase perceptions of plant-based meat's broad adoption, initial interventions should employ descriptive rather than injunctive norms.

Norm Message Framing

The effectiveness of normative messages depends on their framing. Research suggests that negatively framing them can backfire. For example, Mollen et al. (2013) found that descriptive norms messages that described existing positive behaviors (e.g., "every day more than 150 students have a tossed salad for lunch here") resulted in more salads ordered in the university cafeteria than did descriptive norms messages that identified the prominence of the undesired behavior (e.g., "every day more than 150 students have a burger for lunch here") or injunctive norms messages (e.g., "have a tossed salad for lunch"). Additionally, the burger-focused descriptive norms message resulted in significantly more burgers ordered than did the other messages. This finding indicates the importance of a normative message's focus. Interventions should focus on desired behavior rather than undesired behavior.

Applications to Plant-Based Meat

Descriptive or Injunctive?

Descriptive-norms research shows that if many people engage in a particular behavior, others are compelled to do so, even if that behavior is undesirable. In the context of meat consumption, use of descriptive norms might be a double-edged sword. Messages that emphasize how many people eat conventional meat or that highlight an increasing rate of meat consumption, such as "meat consumption is at an all-time high," might entice people to eat even more conventional meat. On the other hand, positively framed descriptive norms, such as "many people are reducing their meat consumption" or "many people are choosing plant-based options," would be helpful. For example, Campbell-Arvai et al. (2014) suggested this message: "Over the course of the school year so far, 85% of students visiting this dining hall selected a meat-free menu option as a more environmentally sustainable choice. Join your fellow students in helping to protect the environment by going meat-free today" (p. 469). This statement points out what other students actually do (via a descriptive norm) and frames it as the preferred behavior (via an injunctive norm).

Additionally, dynamic descriptive norms, including those that utilize future-growth claims, appear to be even more successful than static norms in targeting meat reduction. Therefore, in promoting plant-based meat, message designers should focus on continuing behavioral change trends, as in "this upward trend in plant-based meat choices is expected to continue over the next five years."

In the case of injunctive norms, the word "should" is operative. Injunctive norms typically refer to what important others think should be done. Context may influence who these others are. In dining halls, where peers may be important others, injunctive norms messages, such as "eighty-five percent of students think that eating meat-free is a good choice for reducing environmental impact," may be effective. However, as noted, injunctive norms appear to have mixed effects on behavior. Accordingly, we recommend that studies and programs first implement descriptive norms and either implement injunctive norms as a secondary messaging strategy, as did Campbell-Arvai et al. (2014), or further investigate the role of injunctive norms prior to implementation.

Finally, as discussed in Part II of this working paper, message designers should carefully choose the broader message components in norms interventions. In addition to the type of social norm, the message source, channel, and framing strongly influence consumers' intentions and perceptions. Executed poorly, the message will be ineffective or may even backfire. Future research is needed to understand these nuances in the context of plant-based meat.

Future Research Directions

Although ample evidence shows that descriptive social norms can reduce meat consumption, no research has directly explored how these norms specifically influence plant-based meat consumption. Given the effective outcomes Sparkman and Walton (2017) found in the context of meat reduction, future research should explore the potential role of social norms messaging in increasing plant-based meat consumption.

Plant-based meat has already been moderately adopted (Bryant et al., 2019; Szejda 2019). Messaging research should leverage and test statistically sound claims about this moderate adoption. We suggest that research begin by testing descriptive rather than injunctive norms to target plant-based meat adoption. Furthermore, this research should explore the potential effects of different types of descriptive norms in this context. Specifically, it

should test future-growth norms against other dynamic norms and static norms against dynamic norms in the context of plant-based meat adoption.

Part II Conclusion - Theory

Both behavioral change theories and social influence theories provide important frameworks and concepts to consider when promoting plant-based meat. Each theory suggests an outline of useful variables for message designers to target in order to influence intention to consume plant-based meat and actual consumption of plant-based meat. In the message design process, one must consider which variable one is interested in targeting and how a theory's other components influence this variable.

Part III: Message Content

The first step to designing a successful message is determining the message content, or the meaning one wishes to convey (see the summary of the Transactional Model of communication above). On the basis of our literature review, we identified two areas of effective content for message construction: desirable product attributes and dynamic social norms. In the sections below, we first offer insights on which product attributes to highlight. In order of effectiveness, these include taste and sensory appeal, familiarity, ease of preparation and meal context, health and protein content, and altruistic benefits. Lastly, we offer a short recap of social norms framing. While most message content recommendations apply to both the traditional meat consumer and the meat reducer segments, research-based targeting recommendations will be highlighted within each section when applicable.

It is important to note that the majority of consumers have foundational needs that must be met in order for them to consider a food choice, including taste, cost, and convenience (see Working Paper 1). Once a product meets these core needs, an individual is more likely to consider evolving drivers of food choice, such as health issues or the ethical and environmental impact of a food. However, the relative importance of each evolving driver varies by consumer segment. While many consumers appreciate the benefits of these evolving drivers, the barriers to *acting* on them are too strong for most consumers if the core drivers are not adequately addressed.

While price is a core food-choice motivator, for plant-based meat, little to no current research highlights a product's cost as an effective *messaging* point in influencing consumer behavior. Thus, we are unable to provide an evidence-based recommendation about this topic in the following sections.

Core Driver: Taste and Sensory Appeal

When consumers consider purchasing plant-based meat, taste is their top desired product attribute (Parry & Mitchell, 2019). However, current consumer research finds that the sensory attributes of most substitutions for conventional meat products, including plant-based meat, are unsatisfactory for consumers (Precision Research, 2018; Tucker, 2014). Currently, many products lack sufficient appeal in terms of flavor, juiciness, and texture (Elzerman et al., 2013; Schouteten et al., 2016).

Taste preferences for plant-based meat vary by consumer segment. Current non-consumers and moderate consumers of plant-based meat generally want plant-based products to be closer to conventional meat in their sensory properties, while some vegetarian segments do not desire plant-based meat to any more closely resemble conventional meat (Hoek et al., 2011a). While many vegetarians report perceiving the sensory properties of plant-based meat as already similar to those of conventional meat (Apostolidis & McLeay, 2016b), many omnivores desire greater similarity to conventional meat.

Rich descriptions of products have been shown to be influential in the context of plant-based messaging. In comparing descriptions of vegetables as basic (e.g., "green beans"), healthy restrictive (e.g., "light 'n' low-carb green beans and shallots"), healthy positive (e.g., "healthy energy-boosting green beans and shallots"), or indulgent (e.g., "sweet sizzlin' green beans and crispy shallots"), Turnwald, Boles, and Crum (2017) found that indulgent labeling resulted in significantly greater selection of vegetables by participants compared with the other conditions. Additionally, plant-based product names that highlight taste and positively perceived plant-related descriptors, such as "field-grown" and "garden," have been found to increase product sales (Bacon, Wise, Attwood, & Vennard, 2018). Results from these studies suggest that highlighting the great taste of otherwise standard food in an appealing way is a promising strategy and should be a future research area for messaging about plant-based meat. Please refer to Working Paper 4 for further information about indulgent labeling.

In light of these research findings, messages that focus on sensory appeal should seek to highlight the properties of plant-based meat that are similar to those of conventional meat (taste, texture, juiciness, appearance), especially if targeting the traditional meat consumer or meat reducer population segments.

Core Driver: Familiarity

Plant-based meat is simultaneously familiar and novel. On one hand, meat made from plants is a novel concept to many consumers, yet on the other hand, plant-based meat is similar to conventional meat in terms of sensory properties. Depending on consumer segment, target audience members will differ in their perception of plant-based meat's familiarity or novelty. In terms of novelty, some consumers find plant-based meat a new, innovative food that is either interesting and adventurous or unappealing (depending on the level of food neophobia; Bryant et al., 2019; Hoek et al., 2011a). Overall, Parry and Mitchell's (2019) experiment found that traditional meat consumers and flexitarian consumers tend to be more interested in foods that they find traditional, familiar, or comforting than in foods that they perceive as innovative or novel. Again, however, research highlights that these findings vary by audience segment, and some consumers desire to eat plant-based meat as a novel, fun food choice (Apostolidis & McLeay, 2016a; Hoek et al., 2011a). Messaging recommendations for plant-based meat as both familiar and novel are delineated below.

Familiarity and Tradition

In Parry and Mitchell's (2019) implicit study, familiarity and tradition were primary purchasing drivers, falling below only taste in importance. Consumers report that a weighty barrier to using plant-based meat is lack of familiarity with the product itself (Hoek et al., 2011a). A recent study of consumers in the U.S., China, and India found that prior familiarity with plant-based meat was a strong predictor of plant-based meat consumer adoption (Bryant et al., 2019). To increase consumer perception of plant-based meat as familiar (and thus increase adoption), messages may seek to highlight plant-based meat's status as widely known and recognized—that is, utilize descriptive norms. Therefore, messages that target consumer awareness as an outcome may be useful in building consumer adoption over time. Other useful messages are those that highlight the product as traditional and already in a familiar form, in that it is similar to conventional meat and can be used in familiar meals and recipes, as well as social contexts such as barbecues.

Meal Context

Care should be taken to place novel foods in the realm of the familiar. Therefore, meal context is an important consideration for consumer adoption of plant-based meat. Studies show that people often prefer individual food items all together in a meal rather than separate (King, Weber, Meiselman, & Lv, 2004; King, Meiselman, Hottenstein, Work, & Cronk, 2007), and this has been found to be true in the case of plant-based meat. For example, participants in Elzerman et al.'s (2011) experiment rated plant-based meat as part of a complete meal higher than plant-based meat on its own. Additionally, consumers must find that the plant-based meat product "fits" with the rest of a meal in order to be willing to consume it (Elzerman et al., 2015). Thus, in order to gain the greatest appeal, plant-based meat should be messaged as a delicious component of a whole meal that goes well with other foods and can be used to create one's favorite meals.

It should be noted that a related messaging strategy is to emphasize the centrality of meat products in a dish. Just like conventional meat, plant-based meat may be placed in the center of a meal, allowing consumers to maintain food choices that fit within their accustomed desires and habits without exerting significant effort to change their behavior. In accordance with this, messaging that highlights plant-based meat as a useful and easy swap for conventional meat products in a meat-centered meal may influence consumers' interest in and adoption of plant-based meat.

Novelty

Both familiarity and novelty are appealing to consumers, but familiarity is a stronger motivation. This dichotomy between familiarity and novelty, as well as consumer segmentation, must be taken into consideration. Findings from consumer research highlight that the desire for new, fun, and exciting foods is a driver of some non-vegetarians' purchase and consumption of plant-based meat (Apostolidis & McLeay, 2016a; Hoek et al., 2011a). If targeting these adventurous, non-food-neophobic consumers, one should utilize messaging that highlights plant-based meat as innovative and exciting to increase consumer adoption while keeping some aspects of familiarity, such as meal context and product form. However, this messaging will be effective only if the product is actually appealing to the senses (Apostolidis & McLeay, 2016a).

A challenge in targeting those who dislike trying new foods—food neophobes—lies in messaging that entices consumers to try a new version of a product or the same product a second time. Some plant-based foods, such as tofu, are liked more with consumption over time (Hoek et al., 2013). This is an important strategy to develop, as Bryant et al. (2019) found that, across the three most populous countries, overall fear of new foods predicted an individual's adoption of plant-based meat (Bryant et al., 2019). Hoek et al. (2013) suggest that strategies that encourage consumers to try these new and improved products are likely to be more effective for neophobes than messages about the product itself (Hoek et al., 2013).

Core Driver: Convenience

Convenience, or ease of preparation and product accessibility, is a core driver of food choice (see Working Paper 1) and a motivating attribute for consumption of plant-based meat (Parry & Mitchell, 2019). It should be noted that many of the following reviewed consumer studies were conducted prior to the release of modern plant-based meat products. Thus, their results may not reflect consumer perceptions of these new products, including of their taste and ease of preparation. These lessons should, however, be incorporated by any developers of new plant-based meat products.

Previous consumer research shows that people perceive plant-based meat to be less convenient—not as easy to prepare and not as available in retail outlets—than conventional meat (Hoek et al., 2011a). In fact, in an Australian interview study, participants reported that promotion of plant foods should incorporate messaging that informs "how to prepare quickly and easily" (Lea et al., 2005, p. 804). An abundance of behavioral dietary research highlights that people will not change their eating habits unless they perceive that they have the ability to do so (see self-efficacy section below; Deshpande, Basil, & Basil, 2009; Lea & Worsley, 2003; Lea et al., 2005; Liou, Bauer, & Bai, 2014; Pohjolainen et al., 2015). Messages targeting efficacy beliefs may increase audience members' perceptions of plant-based meat's convenience.

Messaging is likely to appeal to the widest audience by describing plant-based meat as convenient and easy to prepare. Messages should contain instructions for preparation, highlighting plant-based meat's similarity to conventional meat (where applicable) in its ease and quickness of preparation, as well as its suitability within a broader meal context.

Evolving Driver: Health Benefits

Research indicates that consumers perceive a number of health benefits of plant-based meat, including high protein and low saturated fat content and usefulness in weight control (Elzerman et al., 2013; Hoek et al., 2011a; Parry & Mitchell, 2019). However, some consumers also report concerns about plant-based meat's healthiness, including possible lack of protein, other nutritional deficiencies, and indigestibility (Elzerman et al., 2013).

Any messages about plant-based meat's health benefits should frame these benefits as a positive gain, not an absence of a negative. This means, for example, that a plant-based meat product should be marketed as "heart-healthy" (a term promoting the presence of something) rather than "low in cholesterol" (a term examining the absence of something).

Protein content is one of the most salient aspects of plant-based meat's perceived health attributes and is often reported as a concern or a desired attribute in plant-based food research (Elzerman et al., 2013; Lea et al., 2006; Parry & Mitchell, 2019; Wyker & Davison, 2010). High protein content is the top-reported attribute that consumers look for when purchasing plant-based meat and the top-reported product label that drives purchase of plant-based meat (Parry & Mitchell, 2019). Because protein is both a highly desired core attribute of plant-based meat (Parry & Mitchell, 2019) and a salient perceived barrier (e.g., Wyker & Davison, 2010), high protein content should be the central point highlighted in health-focused marketing messages, as this will appeal to the majority of consumers.

Evolving Driver: Altruistic Benefits

Although research demonstrates that most consumers are motivated by the core drivers of taste, price, convenience, and familiarity, consumers also generally acknowledge and appreciate the altruistic benefits of plant-based meat (e.g., environmental impact and animal welfare; Apostolidis & McLeay, 2016b; Elzerman et al., 2013; Deloitte, 2016; Hoek et al., 2011a). In their implicit perception study of the plant-based category, Parry and Mitchell (2019) found that altruistic benefits were among the least influential drivers of purchasing behavior among traditional meat consumers. Similarly, in their review of meat reduction studies, de Boer and Aiking (2017) caution that meat consumption's environmental effects are complex and difficult to convey simply and understandably to the majority of consumers. Moreover, purchasing behaviors of only some consumer segments, including meat reducers and vegetarians, are influenced or motivated by altruistic benefits (Apostolidis & McLeay,

2016b). While many people have favorable attitudes toward sustainability and animals, the core-driver barriers to acting on these attitudes are too strong for most. More than anything, products that meet taste, price, convenience, and familiarity expectations will reduce these barriers (see Working Paper 3).

In accordance with these findings, altruistic benefits are unlikely to be especially effective for the traditional meat consumer. However, they may be useful for certain consumer segments. In such cases, we recommend employing them alongside appeals to the traditional core drivers of food choice, especially taste (Hoek et al., 2004; de Boer & Aiking, 2017), to make clear to consumers that the product meets their foundational food-choice needs.

Social Influence Driver: Descriptive Norms

Highlighting descriptive norms is another promising strategy for increasing consumer adoption of plant-based meat. In the above section on behavioral and social influence theories, we identified social norms as a key predictor of behavior. Researchers typically categorize social norms as one of two types: descriptive (norms that describe current normative behavior) and injunctive (norms that describe important others' behavioral expectations; Cialdini, 2003). Of the two types, research indicates that descriptive norms are likely to be most effective for promoting adoption of plant-based meat. As time passes and adoption rates increase, injunctive norms will probably play a greater role. Dynamic norms are descriptive norms that show increased popularity over time. In cafeteria settings, dynamic norms were effective at reducing meat consumption (Sparkman & Walton, 2017) and provide a promising area of research for message content. In online studies, extending dynamic descriptive norms to convey future growth—future-growth dynamic norms—showed even greater potential for influencing behavior change (Sparkman & Walton, 2017). For further details, please see the review of social norms literature in Part II above.

Suggestions for Future Research

Some messaging content areas are largely in need of further research. Future studies should test a variety of specific messages (and their combinations) and analyze their effectiveness by consumer segment (with a focus on meat reducers and traditional meat consumers). Ideally, these messages should be tested in an ecologically valid environment (e.g., online ads, in-store purchasing, television advertisements) in order to elicit realistic responses from participants, with behavior as a key measured outcome.

Most research has focused on the message content areas taste, protein content, familiarity and novelty, meal context, and convenience. Taste messages should highlight the sensory properties of plant-based meat that are similar to those of conventional meat, such as taste, texture, juiciness, and appearance. Health claims should feature protein content as a top messaging point. Depending on target audience, messages should frame plant-based meat as traditional, familiar, and close to conventional meat or novel and exciting. Food neophobes may benefit from messaging that encourages trying plant-based meat in addition to familiarity messaging. Messages that highlight plant-based meat's convenience should describe the product as easy to access and prepare. Dynamic descriptive norms are a promising area for future research and application to plant-based meat, as they have effectively reduced meat consumption in a cafeteria setting.

Since these points are probably the most effective, additional research to develop more-specific messaging recommendations for marketers would be useful. In particular, future research should focus on sensory appeal claims, as taste is the number one food-choice motivator. More specifically, researchers should test the degree to which sensory claims accompanied by adjunct health or sustainability messages are effective. For instance, future

studies could examine whether altruistic appeals as secondary messages have any influence on the effectiveness of taste claims and, if so, to what degree this effect persists within each consumer segment. It would also be useful to understand the degree to which health-focused messaging may impact taste expectations of plant-based meat. For example, if a plant-based burger package displays messages about health, are consumers less likely to think the product will taste good? Studies examining the application of social norms to plant-based meat and their framing as dynamic or future-growth dynamic would be especially fruitful. Rigorous research that addresses these gaps will further guide effective messaging in the promotion of plant-based meat.

Part III Conclusion - Message Content

A clear consumer segmentation approach is key to building an effective messaging strategy. However, the most effective messaging claims overall will be those highlighting foundational drivers of food choice, especially taste and other sensory properties. Familiarity, tradition, ease of preparation, meal context, and protein content are also important. However, a clear consumer segmentation approach is essential to creating an effective messaging strategy for each brand and product. For the flexitarian segment, because health is a common driver of meat reduction, appeals to this benefit can be made alongside appeals to traditional drivers, as long as future research finds that adjunct health claims are not harmful. As further messaging research emerges, care should be taken to ensure that appeals to evolving drivers, such as health, sustainability, and animal welfare, accompany a core appeal to taste.

To appeal to traditional consumers, messaging should continue to emphasize the traditional drivers, such as taste, familiarity, and convenience. As underscored by Parry and Mitchell's (2019) findings, taste appeals should highlight the similarity of a plant-based meat product to conventional meat, and convenience appeals should incorporate how to prepare plant-based meat. Lastly, appeals to the evolving driver of health might be effective in targeting traditional meat consumers if messages highlight plant-based meat's protein content. However, in accordance with the messaging and food motivation literature, focus should remain on those traditional drivers. Social norms messaging is another promising message content area. In particular, emphasizing dynamic and future-growth dynamic norms will probably drive purchasing.

Conclusion

In order to provide a foundation for marketing plant-based meat, promoters should carefully design messages using theoretical and evidence-based approaches. This paper provides an overview of communication and messaging concepts and recommendations for increasing consumer adoption of plant-based meat. This overview includes a review of key message design concepts, a number of theoretical foundations from which to design and test messages, and product attributes and social norms to incorporate into messages. Application of the theories and research outlined herein, along with implementation of these recommendations, will increase the likelihood of consumer adoption of plant-based meat.

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About GFI

The Good Food Institute is a global nonprofit building a sustainable, healthy, and just food system. With expertise across the scientific, regulatory, industry, and investment landscape, we are accelerating the transition of the world's food system to alternative proteins, using the power of food innovation and markets.

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