WORLD RESOURCES INSTITUTE

PLAYBOOK FOR GUIDING DINERS TOWARD PLANT-RICH DISHES IN FOOD SERVICE

SOPHIE ATTWOOD, PAULA VOORHEIS, CECELIA MERCER, KAREN DAVIES, AND DANIEL VENNARD

WRI.ORG

ABOUT THE AUTHORS

Sophie Attwood is Senior Behavioral Scientist with the Better Buying Lab, an initiative within World Resources Institute.

Contact: sophie.attwood@WRI.org.

Paula Voorheis is a graduate of the London School of Hygiene and Tropical Medicine with an MSc in Public Health (Health Economics).

Contact: paulavoorheis@gmail.com.

Cecelia Mercer is an Origin Green Ambassador MSc Business Sustainability graduate of University College Dublin Smurfit Graduate Business School.

Contact: ccmercer93@gmail.com.

Karen Davies is Managing Partner of Triniti Marketing, a behaviour change consultancy.

Contact: karen.davies@triniti-m.com.

Daniel Vennard is Director of the Better Buying Lab, an initiative within World Resources Institute.

Contact: daniel.vennard@WRI.org.

Design and layout by:
Carni Klirs
cklirs@wri.org

ACKNOWLEDGMENTS

We are pleased to acknowledge our institutional strategic partners, who provide core funding to WRI: the Netherlands Ministry of Foreign Affairs, Royal Danish Ministry of Foreign Affairs, and Swedish International Development Cooperation Agency.

World Resources Institute is grateful to the Climate and Land Use Alliance, the ClimateWorks Foundation, the Oak Foundation, and the Sally Mead Hands Foundation for supporting this research, and to our partners who are helping advance this work. Authors are responsible for the content.

Thanks to Better Buying Lab Members and Network for contributing to the industry consultation process, including Alex Glen and Tony Davison (Quorn); Andrew Stephen and Rosie Raynor-Law (the Sustainable Restaurant Association); Scott Giambastiani (Food at Google) and Anna Gavrieli (Compass at Google); Ria van der Maas, Frank Galestien, Einav Gefen, Diko Tomchev, Hesham Rabia and Robert Voicu (Unilever); Suzanne Makkink (Greendish); Ghislaine C. Amsler Challamel and Jackie Bertoldo (Stanford Residential & Dining Enterprises); Rachel Sylvan (Sodexo); Becky Garrison (USA Pulses); Caroline Meledo (Hilton); John Stoddard and Stacia Clinton (Health Care Without Harm and Practice Greenhealth).

TABLE OF CONTENTS

1 Foreword

3 Executive Summary

7 Introduction

13 Building the Playbook

17 The Playbook

27 Product Interventions

37 Placement Interventions

41 Presentation Interventions

47 Promotion Interventions

53 People Interventions

61 Summary

64 Appendix 1: Details on the Methodology Used to Build the Playbook

69 References

74 About WRI

FOREWORD

The food system must undergo significant changes to ensure a future that can adequately feed a growing population while avoiding the worst impacts of climate change. By 2050, when nearly 10 billion people will live on the planet, we must produce 56 percent more food than today. At the same time, greenhouse gas emissions from agriculture and land-use change must drop by two-thirds to limit global warming to 1.5 degrees Celsius, in line with climate science.

It's a tall challenge–but, with the right changes in how food is produced and consumed, it's one the world can meet.

A sustainable food future is only possible, though, if diets in high meat-consuming countries such as the United States and in Europe move toward less resource-intensive foods like vegetables, legumes, grains, and pulses. WRI's research has found that even small reductions in people's meat consumption can significantly reduce the carbon footprint of their diets. While a high-reward strategy, shifting people's behavior toward more sustainable choices requires a nuanced understanding of how we make decisions around food. This growing research area is at the cutting edge of climate action, pulling on expertise in marketing and behavioral economics as well as real-world experience from the food industry.

With more people dining out than ever before, including around half of all Americans, food service companies are at the heart of helping diners move to diets that are healthy for people and the planet. They have a well-honed knowledge of how to drive diners toward various options, insight that can and should be applied to the challenge of encouraging more sustainable food choices. They interact with millions of consumers each day, exponentially increasing their potential impact. And by engaging consumers and staff in reducing food-related emissions, they can make progress toward achieving their own internal sustainability targets.

This playbook outlines effective behavior change strategies that food service companies can use to serve up sustainable food options diners will want to buy. These strategies are based on up-to-date evidence from behavioral science research combined with expert input from the food service industry. Whether developing creative new dishes, changing display areas, or adding appealing language to menus, the playbook's 23 priority strategies can help more companies make plant-rich diets a mainstream favorite.

The future of food is innovative. It's sustainable. It's driven by strategies backed by behavioral science. And it doesn't sacrifice any of the taste.

Andrew Steer
President
World Resources Institute

EXECUTIVE SUMMARY

Encouraging more people to reduce their intake of ruminant meat and adopt a more plant-rich diet can play an important role in reducing the environmental impact of food. The food service sector has a particularly important role to play in enabling this dietary change given that vast numbers of people regularly eat away from home. This report lays out 23 prioritized behavior change interventions that the food service sector can use to encourage diners to select more plant-rich dishes.

To reduce the environmental impacts of the food service sector, food service providers need clearer guidance on how to use behavior change interventions to encourage diners to select more plant-rich meals and reduce the numbers of diners who choose higher greenhouse gas emitting animal-rich meals, particularly containing beef or lamb.

Drawing on a scoping review of relevant academic literature and a multistage industry consultation process, this report presents a "Playbook" of 23 behavior change interventions that food service providers can use to encourage diners to select more plant-rich meals. These interventions were shortlisted as priority approaches during an industry consultation from a longer list of 57 interventions, based on ratings across two criteria: how greatly each is perceived to influence diners' choices and how feasible each is considered to be to implement.

The shortlist has been organized according to a "5P" framework that refers to the main targets for change. This includes Product interventions that focus on modifying the dish or product itself (seven interventions), Placement interventions that involve changing food displays (two interventions), Presentation interventions that outline ways to redesign food menus (four interventions), Promotion interventions that focus on how to price and market plant-rich meals more effectively (four interventions), and People interventions that engage staff members to influence diners' choices (six interventions).

The remainder of this Playbook contains guidance that is intended to help changemakers in the food service industry adopt the shortlisted behavior change interventions by outlining why each intervention works and how each may be used in practice. In addition, a range of case studies detail success stories, give examples of how others have adapted each intervention to suit their contexts, and provide evidence that the food service sector can play a key role in enabling diners to choose more sustainable plant-rich meals.

Food service providers need clearer guidance on how to use behavior change interventions to encourage diners to select more plant-rich meals and reduce the numbers of diners who choose higher greenhouse gas emitting animal-rich meals, particularly containing beef or lamb.

INTRODUCTION

Per gram of protein, beef production requires 20 times more land and emits 20 times more greenhouse gas (GHG) emissions than producing plant-based proteins like beans, peas, and lentils. As the global population grows to 10 billion people by 2050, 56 percent more crop calories will be needed to meet demand. Achieving this goal will require large numbers of people to adopt more resource-efficient plant-rich diets, with the food service sector positioned to play an important role in helping accelerate this dietary transition.

BOX 1 | DIETARY DEFINITIONS

Plant-based food: Foods derived from plants and fungi rather than animal sources. This includes fruit and vegetables, beans, grains, legumes, mushrooms, nuts and seeds, plant oils, herbs, and spices.

Plant-rich diet: A diet in which plant-based produce makes up the majority of all foods consumed but that permits small amounts of animal products, including ruminant meat, to be eaten. The terms *plant forward diet* and *sustainable diet* are also commonly used to refer to the same pattern of eating, including in this report.

Pescatarian diet: A diet that excludes meat but that permits consumption of fish and seafood. Most pescatarians are also lacto-ovo vegetarians (i.e., they also consume eggs and dairy).

Lacto-ovo vegetarian diet: A diet that excludes meat, fish, and seafood but that permits consumption of other animal products (eggs and dairy).

Source: Authors.

Food and the Environment

Producing animal-based foods, especially meat from ruminant livestock (cattle, sheep, and goats), uses more land and emits significantly more greenhouse gases than producing plant-based foods (see Box 1 for definitions). For example, per gram of protein, beef production requires 20 times more land and emits 20 times more GHG emissions than producing plant-based proteins like beans, peas, and lentils (Ranganathan et al. 2016). A 2013 study by the UN Food and Agriculture Organization (FAO) placed total annual GHG emissions from animal agriculture at 14.5 percent of all human emissions,[1] of which beef contributed 41 percent (Gerber et al. 2013). To put this number in context, the average annual GHG emissions from beef production alone are equivalent to those produced by the entire nation of India (Gerber et al. 2013; Climatewatch 2014).

What's more, production of ruminant livestock uses a vast amount of agricultural land. In the United States alone, for example, beef accounts for roughly half of the land used to produce food for the average U.S. diet, while providing just 3 percent of the calories (Searchinger et al. 2019). Given the world's growing population and changes in dietary preferences as countries transition to more Westernized diets, demand for animal-based foods is projected to increase by 68 percent between 2010 and 2050, with ruminant meat demand set to rise by 88 percent during this period (Searchinger et al. 2019). This growth in demand for animal-based foods will make it far harder for the world to halt deforestation and prevent further agricultural expansion, both of which are needed if we are to reach the Paris Agreement goal of keeping global temperature rises to well below 2 degrees Celsius by midcentury.

Reducing Demand for Ruminant Meat

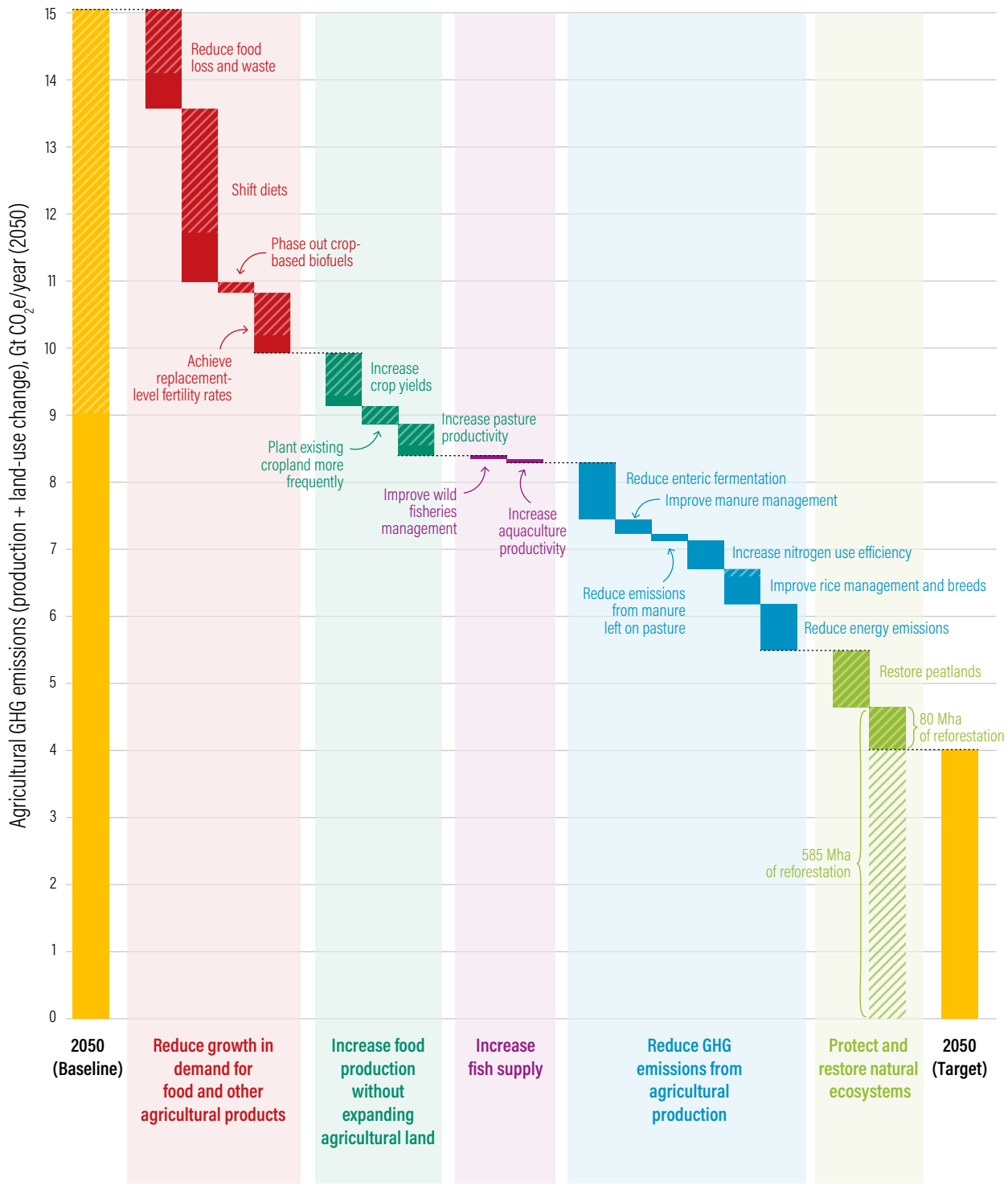
One of the most important ways to lessen the environmental impact of livestock production is to reduce demand for ruminant meat and encourage a shift to more plant-rich diets. This type of diet features mainly plant-based foods, including vegetables, legumes, fruits, grains, pulses, nuts, or seeds but, unlike a vegetarian or vegan diet, permits small amounts of animal-based foods, like meat, eggs, dairy, and fish to be eaten.

Shifting away from a diet rich in ruminant meat to one that contains a far higher proportion of plant-based foods is considered by experts to be an essential strategy to mitigate climate change and avoid further environmental degradation (Willett et al. 2019). As Figure 1 shows, encouraging a dietary shift away from ruminant meat is associated with a large projected decline in GHG emissions, and is one of the most important food-related solutions available to us.

As the global population grows to almost 10 billion by 2050, we are predicted to need 56 percent more crop calories than were available in 2010—7,400 trillion extra calories in total—to meet rising demand. This goal cannot be met by changes in food production efficiency or reductions in food loss and waste alone; it will require large numbers of people to adopt resource-efficient diets. For exam-

1. Estimate includes GHG emissions associated with agricultural production as well as land-use change.

Figure 1 | Shifting toward Plant-Rich Diets Can Play an Important Role in Feeding 10 Billion People while Keeping Global Temperature Rises to Well Below 2 Degrees Celsius



Source: Reproduced from Searchinger et al. (2019, 427).

ple, limiting ruminant meat intake to about 50 calories per person per day—the equivalent of around 1.5 hamburgers per person per week—is estimated to nearly eliminate the need for further agricultural expansion (and associated deforestation) between now and 2050 (Searchinger et al. 2019).

What's more, a sustainable plant-rich diet is also associated with reduced risk of a number of non-communicable diseases, including some cancers and cardiovascular diseases. It thus confers benefits for individual as well as planetary health (Willett et al. 2019).

The Role of the Food Service Sector

To encourage a shift toward more plant-rich diets, actors from all areas of the food industry need to engage with this issue. The food service sector has a particularly important role to play in enabling dietary change, given that vast numbers of people regularly eat away from home. For example, recent statistics from the United States show that spending on dining out represents around 50 percent of the average American's food budget (Saksena et al. 2018). Throughout this Playbook, we use the term *food service sector* or *industry* to refer to any business or institution responsible for providing meals prepared outside of the home, including restaurants, cafés, canteens, workplace dining facilities, school or hospital cafeterias, and catering operations.

The food service sector is uniquely positioned to take a leadership role in innovating and scaling new and effective solutions to influence the foods that diners choose when eating out. This sector is responsible for developing craveable plant-rich meals that can entice diners away from meat-centered dishes. Already rich in expertise on how to market and sell foods of all types, the food service industry is also well placed to apply these capabilities to helping diners choose healthier and more sustainable plant-rich options.

Changing Diner Behavior

Key to the success of any strategy to influence diners' food choices is an ability to target the fundamental drivers that underpin this behavior. Fortunately, a growing body of evidence is now available indicating what these drivers are, including taste, price, convenience, and how we might go about influencing them.

One of the strongest conclusions to emerge from this research is that decision-making around what to eat is rarely a rational and carefully thought-through process. Instead, food choices tend to be driven by habit and familiarity, often happen very quickly, and are influenced by lots of seemingly small factors in the dining environment, usually outside of conscious awareness. Examples of these include the placement, size, pricing, position, packaging, or language used by food service providers to describe the products and dishes on offer (Hollands et al. 2016).

Why a Playbook and Who Is This For?

What is now needed is clear guidance to help food service providers better understand and use these myriad influence strategies in their own operations to encourage their diners to shift to choosing more plant-rich options. This Playbook intends to meet this need by presenting a full list of behavior change strategies (hereafter referred to as "interventions") for use in food service, in addition to highlighting which of these interventions should be prioritized for implementation and further research given their potential for impact.

The intended audience for this guide is anyone working in the food service sector who may be interested in making changes within their operations to encourage diners to choose more plant-rich options. This includes chefs, food servers, managers, sales people, marketing and communications professionals, food operators, distributors, researchers, nutritionists, dieticians, and procurement teams. We refer to this guide as a "Playbook" because we hope the interventions that it lists encourage food service employees to take action to enable behavior change in both staff and diners.

We refer to this guide as a "Playbook" because we hope the interventions that it lists encourage food service employees to take action to enable behavior change in both staff and diners.

BUILDING THE PLAYBOOK

Research in behavioral science offers much insight into factors that influence people's food choices. This chapter summarizes the methods we used to develop a prioritized list of behavior change interventions that can help food service providers encourage more diners to select plant-rich dishes.

How We Built the Playbook

For full details on how we designed and built this Playbook, please see Appendix 1. In brief, we reviewed just under 4,500 academic research papers to find studies that have used behavior change interventions to shift people to buy or eat more plant-rich foods. We included studies that specifically aimed to reduce the environmental footprint of food, as well as broader research testing interventions to shift food choices for other reasons, like promoting healthier diets. Our focus was primarily on studies conducted in food service settings, but we also included research in supermarkets as this can provide insights relevant to self-service dining.

We scanned all identified papers and pulled out 89 that were relevant to our goals. Detailed reasons for excluding remaining studies are listed in Figure A1 in Appendix 1. This research was produced by organizations based in 14 different countries, with the majority of studies originating in the United States (41 studies) or Europe (27 studies). Thirty-three of the studies were conducted in real-life dining facilities, a further 27 in simulated dining environments or online experiments (e.g., virtual supermarkets, lab-based buffets), and 29 in retail settings (e.g., supermarkets, grocery stores). Most of this research (63 studies) focused on interventions to promote healthier diets. Seventeen studies looked at interventions to promote more sustainable choices, with 15 of these specifically looking at encouraging a shift away from animal-based to more plant-based foods. The remaining 9 studies focused on food choice more generally (e.g., marketing research to boost sales of specific products like confectionary or drinks).

Next, we sorted through these 89 studies more thoroughly, recording details of the interventions that had been tested. Once we had this information in one place, we applied a coding scheme to classify each element in the intervention. We then reviewed and grouped together codes of similar type. For interventions not specifically designed to encourage more diners to choose plant-rich options, we took the descriptions given by authors and used these as the basis to generate ideas for new, plant-rich versions of the same approach. As such, the final outcome is an "evidence-inspired" list of interventions that presents the range of possible approaches, rather than a list that summarizes the existing evidence base.

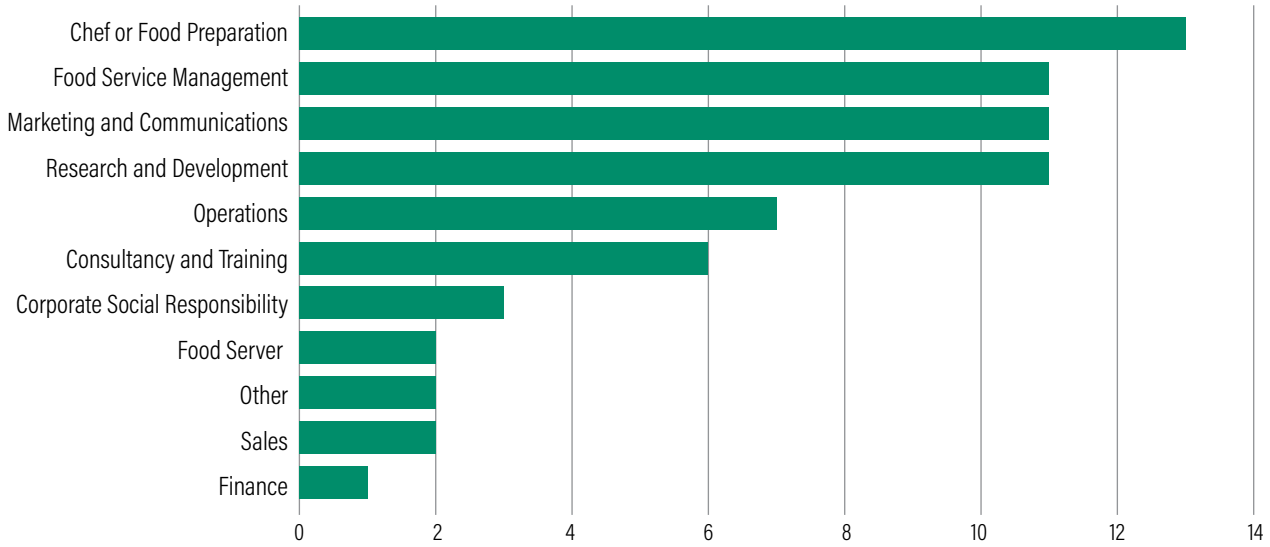
Once we had the full list, we organized the interventions into groups within a "5P" framework. Each *P* in this framework refers to the main target of the intervention—the dish or product itself (Product), how the food is displayed to diners (Placement), how menus are organized and designed (Presentation), how the food is priced and promoted (Promotion), and the staff working in food service (People).

We then sent this list to a group of industry representatives, asking for their feedback and whether they knew of any additional interventions to add to the Playbook. We gathered their comments and made edits and additions. At the end of this process, we had a final list of 57 interventions across the 5P framework, as displayed in Table 1.

Finally, we sent an online survey to a larger group of food industry representatives, asking them to rate the list of 57 interventions according to those they thought most likely to work well (the "impact" criteria) and those they considered easiest to do in practice (the "feasibility" criteria) (see Appendix 1 for further details on the survey process and industry sample). A total of 69 industry representatives provided complete responses to this survey (a response rate of 90 percent, from a total of 77 respondents). This sample contained representatives based in 16 different countries, although the majority were based in the United States (23 respondents) or the United Kingdom (21 respondents). The 69 industry representatives were employed by 44 different organizations in 9 different sectors, covering the job roles outlined in Figure 2.

Results from this industry survey enabled us to assign a feasibility and impact score to each of the 57 interventions. From the data, we then calculated the average impact and feasibility score (median value for each criteria) across the whole sample, and shortlisted any intervention that fell above this threshold on both criteria.

Figure 2 | Job Roles of the Industry Representative Sample Who Rated the Long List of 57 Behavior Change Interventions



Source: Authors.

For an appraisal of the strengths and limitations of the approach that we took in building this Playbook, please refer to the summary section. A key point to note here is that our approach to shortlisting interventions is solely based on the experience and judgment of our industry sample and does not necessarily reflect the strength of the research evidence on each specific intervention, many of which have yet to be tested using rigorous research methods like randomized controlled trials (RCTs). As evidence accumulates, we plan to integrate this research and modify the prioritized shortlist accordingly. In the interim, we strongly encourage food service providers to adopt a test-and-monitor approach to interventions listed before scaling techniques throughout their operations.

We strongly encourage food service providers to adopt a test-and-monitor approach to interventions listed before scaling techniques throughout their operations.

THE PLAYBOOK

Which behavior change interventions can food service providers use to encourage their diners to select more plant-rich dishes? The following chapters describe the most feasible and impactful interventions, organized into a framework of "5P" target areas—Product, Placement, Presentation, Promotion, and People.

Playbook Structure and Use

This final shortlist of 23 interventions is the basis for this Playbook. Table 1 gives the complete list of 57 interventions, with the shortlisted ones in darker shading. The interventions are listed in order of joint score on both criteria under each P category. The full spectrum of interventions also appears in Figure 3, while the 23 shortlisted interventions are plotted in the top right-hand quadrant of this figure. Each of the 57 interventions has been assigned a reference code (e.g., PRD1, PLC1, PPL1, etc.), which can be used to cross reference from Figure 3 to the full description of each intervention available in Table 1. Figure 4 provides a summary of the 23 shortlisted interventions.

The remainder of this Playbook provides furthers details on the research that supports each of the 23 shortlisted interventions and offers some ideas on how food service providers can use each approach in their own operations. For each approach, we provide a short case study to illustrate how other organizations have used that intervention in their own operations and what they learned from doing so. These examples are intended to provide inspiration and ideas for how change-makers in the food service industry can adapt a given intervention for their own use. Where it is available, we also refer the reader to further information on each intervention.

Table 1 | The Full List of 57 Behavior Change Interventions to Shift Diners toward More Plant-Rich Options in Food Service Settings

► = above the median value on both feasibility and impact criteria, forming the priority shortlist outlined in Figure 3. Cross-reference Table 1 and Figure 3 using the codes listed below.

	INTERVENTION	CROSS-REFERENCE CODE TO FIGURE 3	MEAN IMPACT SCORE* (1 TO 7 SCALE)	MEAN FEASIBILITY SCORE** (1 TO 7 SCALE)
	PRODUCT			
►	**Reduce the amount of meat in a dish while increasing the amount of plants**	PRD1	6.25	5.94
►	**Improve the flavor and texture of plant-rich dishes**	PRD2	6.19	5.95
►	**Introduce one plant-rich day per week, when all dishes served are plant-rich only**	PRD3	5.67	5.85
►	**Improve the appearance of plant-rich dishes**	PRD4	5.73	5.77
►	**Increase the variety of plant-rich dishes on offer**	PRD5	5.88	5.53
►	**Increase the relative number of plant-rich dishes on offer compared to meat-based dishes**	PRD6	5.63	5.26
►	**Introduce plant-rich alternatives to popular meat-based dishes**	PRD7	5.38	5.42
	Develop new, or improve existing, accompaniments to plant-rich dishes	PRD8	5.14	4.75
	Reduce the portion size of a dish that is served to diners	PRD9	4.50	4.79
	Reduce the size of plate that a dish is served on	PRD10	4.50	4.69
	Blend plants into ground or minced meat-based dishes	PRD11	4.27	4.73
	Add decorations to plant-rich dishes to signal to other diners that these have been chosen	PRD12	3.47	4.13
	Introduce specially designed utensils or packaging for eating plant-rich dishes	PRD13	3.67	3.27

Table 1 | The Full List of 57 Behavior Change Interventions to Shift Diners toward More Plant-Rich Options in Food Service Settings (continued)

► = above the median value on both feasibility and impact criteria, forming the priority shortlist outlined in Figure 3. Cross-reference Table 1 and Figure 3 using the codes listed below.

	INTERVENTION	CROSS-REFERENCE CODE TO FIGURE 3	MEAN IMPACT SCORE* (1 TO 7 SCALE)	MEAN FEASIBILITY SCORE** (1 TO 7 SCALE)
	PLACEMENT			
►	**Make self-service plant-rich food displays (e.g., buffets, shelves, food carts, or stations) more engaging**	PLC1	5.39	5.35
	Place plant-rich dishes in a more visible position in a self-service display (e.g., buffets, shelves, food carts, or stations)	PLC2	4.80	5.55
►	**Increase the amount of a self-service display (e.g., buffets, shelves, food carts, or stations) that is dedicated to plant-rich dishes**	PLC3	5.06	5.12
	Provide preplated or prepackaged plant-rich dishes to make these the more convenient choice for self-service	PLC4	4.86	4.64
	Add green leafy plants or fresh fruit and vegetable displays to the dining environment	PLC5	4.44	4.89
	Introduce a plant-rich-only food section within a self-service display (e.g., buffets, shelves, food carts, or stations)	PLC6	4.17	4.50
	PRESENTATION			
►	**Use language on menus to emphasize the positive attributes of plant-rich dishes**	PRS1	6.31	6.00
►	**List plant-rich dishes in the main body of a menu, not in a separate "vegetarian" box or "specials" section**	PRS2	5.81	6.19
►	**Use language on menus to recommend plant-rich dishes**	PRS3	5.69	5.94
►	**Remove unappealing language from menus**	PRS4	5.56	5.81
	List plant-rich dishes first on menus	PRS5	4.46	5.21
	Use language on menus to inform diners that plant-rich dishes are the most popular choice	PRS6	4.67	4.67
	Color-code dishes listed on menus (e.g., red, yellow, green) to help diners recognize that plant-rich dishes are the "better" choice	PRS7	4.33	4.25
	Add carbon footprint labels to menus, food labels, or shelf displays	PRS8	4.42	4.08
	Use language on menus to highlight the downsides of choosing meat	PRS9	3.25	4.20
	Add natural images on menus to prompt diners to choose plant-rich dishes	PRS10	3.47	3.43
	Offer only plant-rich dishes on main menus, with meat-based dishes on request from a server or via separate menus	PRS11	3.53	3.33

Table 1 | The Full List of 57 Behavior Change Interventions to Shift Diners toward More Plant-Rich Options in Food Service Settings (continued)

► = above the median value on both feasibility and impact criteria, forming the priority shortlist outlined in Figure 3. Cross-reference Table 1 and Figure 3 using the codes listed below.

	INTERVENTION	CROSS-REFERENCE CODE TO FIGURE 3	MEAN IMPACT SCORE* (1 TO 7 SCALE)	MEAN FEASIBILITY SCORE** (1 TO 7 SCALE)
	PROMOTION			
►	**Offer diners free samples or taste-testing events for plant-rich dishes**	PRM1	5.28	5.44
►	**Publicize the environmental benefits of plant-rich dishes using marketing materials like posters, leaflets, or TV screens**	PRM2	5.20	5.17
►	**Run cross-product promotions on plant-rich dishes and selected drinks, side dishes, or desserts**	PRM3	5.22	5.11
	Publicize the growing popularity of plant-rich options among other diners using marketing materials like posters, leaflets, or TV screens	PRM4	4.82	5.24
►	**Allow diners to add meat to a plant-rich dish for a surcharge**	PRM5	4.96	4.83
	Help diners role model choosing plant-rich dishes in front of their colleagues, friends, or family	PRM6	4.82	4.94
	Provide on-site plant-rich cooking demonstrations or food preparation workshops for diners	PRM7	5.20	4.53
	Run multibuy or buy-one-get-one-free offers on plant-rich dishes	PRM8	4.64	5.00
	Help diners set plant-rich diet goals and monitor their progress over time using a diet diary or app	PRM9	4.86	4.71
	Encourage diners to participate in plant-rich eating challenges	PRM10	4.65	4.80
	Offer diners additional benefits, rewards, or gifts when diners purchase plant-rich dishes	PRM11	4.83	4.59
	Provide diners with recommendations on how to substitute plant-rich dishes for meat using marketing materials like posters, leaflets, or TV screens	PRM12	4.81	4.52
	Publicize the taste and flavor of plant-rich dishes using marketing materials like posters, leaflets, or TV screens	PRM13	4.07	4.71
	Sell plant-rich dishes at a lower price than meat dishes	PRM14	4.45	4.32
	Coordinate plant-rich dish promotions to tie in with relevant national campaigns	PRM15	4.76	3.76
	Give diners coupons or loyalty card points to redeem on plant-rich dishes	PRM16	4.21	4.16
	Publicize the health benefits of plant-rich dishes using marketing materials like posters, leaflets, or TV screens	PRM17	3.50	4.75
	Use attractive role-models to publicize plant-rich dishes (including celebrities), using marketing materials like posters, leaflets, or TV screens	PRM18	4.21	3.50

Table 1 | The Full List of 57 Behavior Change Interventions to Shift Diners toward More Plant-Rich Options in Food Service Settings (continued)

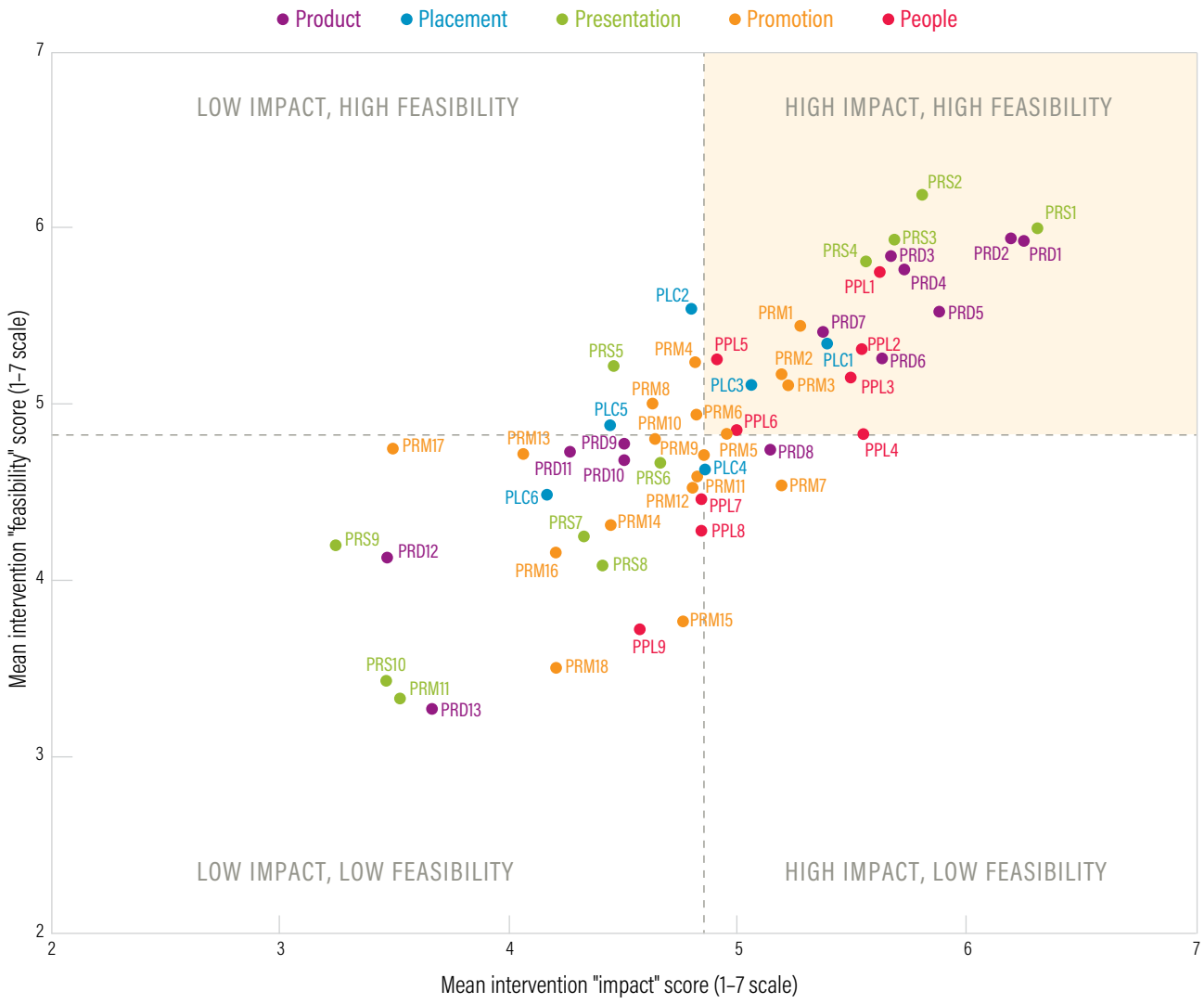
► = above the median value on both feasibility and impact criteria, forming the priority shortlist outlined in Figure 3. Cross-reference Table 1 and Figure 3 using the codes listed below.

	INTERVENTION	CROSS-REFERENCE CODE TO FIGURE 3	MEAN IMPACT SCORE* (1 TO 7 SCALE)	MEAN FEASIBILITY SCORE** (1 TO 7 SCALE)
	PEOPLE			
►	**Provide chefs and food preparation staff with information about the health and environmental benefits of plant-rich dishes**	PPL1	5.63	5.75
►	**Train chefs and food preparation staff in how to cook and prepare plant-rich dishes**	PPL2	5.55	5.32
►	**Encourage front-of-house staff (e.g., waiters, hosts) to try plant-rich dishes themselves**	PPL3	5.50	5.15
►	**Give chefs and food preparation staff access to the right tools, equipment, and ingredients to prepare plant-rich dishes**	PPL4	5.56	4.83
►	**Reward chefs and food preparation staff who create popular plant-rich dishes**	PPL5	4.91	5.26
►	**Provide front-of-house staff (e.g., waiters, hosts) with talking points to promote plant-rich dishes to diners**	PPL6	5.00	4.85
	Create a peer-network for chefs, potentially by using social media, to encourage sharing of plant-rich dish ideas and recipes and to receive support and feedback	PPL7	4.85	4.46
	Train front-of-house staff (e.g., waiters, hosts) to praise and encourage customers who select plant-rich dishes	PPL8	4.85	4.29
	Offer front-of-house staff (e.g., waiters, hosts) financial, material, or social incentives to sell more plant-rich dishes	PPL9	4.58	3.72

Notes:
*Median sample score was 4.85 for impact.
**Median sample score was 4.83 for feasibility.

Source: Authors.

Figure 3 | Industry Representative Ranking of 57 Behavior Change Interventions



Notes: Codes (e.g., PRD1, PRS1, PPL1, etc.) in Figure 3 refer to the 57 interventions listed in Table 1. X and y axes in Figure 3 cross the median scores for impact and feasibility criteria based on responses from 69 industry representatives. Interventions in the top right-hand shaded quadrant are those rated as above average on both criteria (23 in total). This prioritized shortlist is described in detail in the remainder of this Playbook and presented in full in Figure 4.
Source: Authors.

Figure 4 | Twenty-Three Priority Behavior Change Interventions, as Ranked by 69 Food Service Industry Representatives

Note: Interventions listed within each of the 5P categories are ordered according to ranking on joint "feasibility" and "impact" criteria from the industry representative survey.
Source: Authors.

Key Findings from the Research Literature

As noted above, most studies contributing interventions to this review promoted plant-rich diets for health rather than for environmental purposes. We identified just 15 of 89 studies that trialed interventions to encourage more sustainable plant-rich diets specifically. Considering this subset, nearly all studies involved interventions classified under Presentation (e.g., menu engineering approaches and dish labeling, 11 studies), either alone (9 studies) or in combination with Presentation (1 study) or Product interventions (e.g., reduce the portion size of meat, 1 study). Two studies researched Product interventions, one looked at a Placement intervention (e.g., changing the order of products in buffets), and one at a Promotion intervention (e.g., posters communicating the environmental impact of different foods). We were unable to locate any research that has specifically tested the effect of People interventions with the express purpose of producing a dietary shift away from meat and toward plant-rich options in food service settings.

In terms of effectiveness, 9 of the 11 Presentation interventions were effective at encouraging diners to choose more sustainable plant-rich dishes, indicating that this strategy can promote the desired dietary shift. Given the small number of studies that researched other 5P intervention categories, we refrain from commenting further on the strength of the evidence until research accumulates in this area.

We also refrain from stating with certainty which of the 57 individual interventions listed in Table 1 are effective at promoting plant-rich choices in food service. This is both because of the lack of relevant research evidence, as noted above, and because many of the 57 interventions were delivered as part of "multicomponent" packages (e.g., multiple interventions implemented at the same time). This approach makes it very difficult to pick apart which element in a package is responsible for any changes in observed diner behavior (or lack thereof).

We do, however, point the interested reader toward existing academic literature reviews that have attempted to determine the effectiveness of specific behavior change interventions to encourage a reduction in meat consumption. These include two high-quality 2018 reviews by Bianchi and colleagues (see Bianchi et al. 2018a, 2018b).

Key Findings from Industry Surveys

Ranking individual interventions according to summed scores on both impact and feasibility criteria revealed that the intervention that was scored highest by our industry sample was PRS1, followed by PRD1, PRD2, PRS2, and PRS3 (see Table 1 for the full title of each intervention).

The lowest-rated interventions were those that emphasized the negatives of eating meat, restricted choice, or involved redesigning packaging or tableware. The lowest-scoring intervention was PRS11, followed by PRS10, PRD13, PRS9, and PRD12.

The intervention that was scored highest by our industry sample was PRS1—"Use language on menus to emphasize the positive attributes of plant-rich dishes"

PRODUCT INTERVENTIONS

Here we outline seven prioritized Product interventions that focus on changing the food that is served to encourage more diners to select the plant-rich option.

PRD1 REDUCE THE AMOUNT OF MEAT IN A DISH WHILE INCREASING THE AMOUNT OF PLANTS

In more detail:

What determines how much someone eats at a meal? Their hunger? Their nutritional needs? How tasty they find a dish? While these factors do play a role, some less obvious aspects also have a powerful influence on how much we eat. For example, it seems we take cues on what is "enough" food, not necessarily from how hungry we are but from how much is originally served to us (Marteau et al. 2015). Research suggests that changing the portion sizes of meat and plant ingredients in a dish will influence how much of each is eaten, and that this happens without diners realizing that they have consumed a different amount from normal or feeling unsatisfied with what they have eaten (Labbé et al. 2018). This phenomenon is known as "unit bias," which means diners tend to believe the original portion size they are given is the appropriate amount, even if this is so large it leaves them overfull (Geier et al. 2006).

What you can do:

Cut down the amount of meat in the dishes you serve and increase the amount of plant-based ingredients to compensate (Reinders et al. 2017). Rather than using meat as the centerpiece of a meal, consider it as a "condiment" or flavoring on an otherwise plant-rich dish, or experiment with ways to blend plants (e.g., mushrooms) into dishes that contain ground meat, like lasagna or tacos. This approach not only helps reduce a meal's meat content but also can improve the taste profile, as proved by consumer taste tests (Guinard et al. 2016). Another option is to offer plant-rich starters or hors d'oeuvres, to encourage diners to fill up on these before offering them a choice of main dish (in hopes they will then order less meat as they already feel full).

In self-service establishments, consider plates that demarcate portion sizes of different ingredients. These will help diners recognize how much meat to serve themselves (Sharp et al. 2014). You may also wish to consider offering preportioned cuts of meat to encourage diners to take smaller servings when filling their plates (Rozin et al. 2011), or intersperse meat options with plant-rich items in food displays or plate arrangements to reduce the overall amount of meat served while the volume of food remains constant.

Case study:

The Dutch nongovernmental organization Greendish tested the effect of reducing the portion sizes of meat and fish by an average of 12.5 percent and doubling the amount of plants served per dish (i.e., from 75 to 150 grams) on the food choices of nearly 4,000 diners in three restaurants in the Netherlands. Greendish found that diners given reduced-meat dishes ate 31 percent more vegetables and 11 percent less meat or fish than those who were served "regular" portion sizes. When the two groups were asked to rate how satisfied they were with the ratio of meat to plants in their meal, both sets of diners said that they had been served "exactly enough" of the meat or fish portion, indicating that reducing the amount these ingredients did not lower diner satisfaction (Greendish 2018).

Further reading

Greendish. 2018. "Van Der Valk: SME in à la Carte Restaurants." https://greendish.org/en/van-der-valk-case-study/.

Reinders, M.J., M. Huitink, S.C. Dijkstra, A.J. Maaskant, and J. Heijnen. 2017. "Menu-Engineering in Restaurants—Adapting Portion Sizes on Plates to Enhance Vegetable Consumption: A Real-Life Experiment." *International Journal of Behavioral Nutrition and Physical Activity* 14 (1): 41. https://doi.org/10.1186/s12966-017-0496-9.

PRD2 IMPROVE THE FLAVOR AND TEXTURE OF PLANT-RICH DISHES

In more detail:

Texture and flavor are two of the most important features of a dish (Tucker 2014). As a result, improving these two attributes, and communicating these improvements to diners, is a valuable way to shift preferences. Despite this, plant-rich dishes tend to be offered as the healthy option on a menu, rather than as truly tasty and delicious choices (Turnwald and Crum 2019). Consequently, plant-rich meals often lag behind meat-based alternatives in consumer taste tests (Hoek et al. 2011). They are associated with a range of negative preconceptions, including the belief that these options will be bland, heavy, dry, or lacking in crispiness or crunch (Elzerman et al. 2013).

What you can do:

Improve the taste and texture of existing plant-rich dishes on your menu or develop new and exciting dishes that are likely to sell well. Consider using more flavor-boosting ingredients like salt and pepper, herbs, spices, garlic, citrus juices, oils, vinegars, or sauces during preparation, or offer these ingredients to customers, giving them the choice to modify the taste of a dish to their specifications. Plant-rich dishes should offer diners a high-quality, fresh, and authentic choice that is aspirational and pleasurable to eat. Focus on quality ingredients that are prepared using techniques diners believe are specially crafted, artisanal, or that tap into traditions surrounding a dish or its area of origin. These approaches can all help enhance perceptions of quality and taste (Schösler and de Boer 2018).

Case study:

The Good Food Institute (GFI) works with scientists, investors, and entrepreneurs to offer new and interesting solutions to promote plant-rich alternatives to animal products. GFI has worked extensively to understand what makes a flavorsome and appealing plant-rich dish, reviewing a wide variety of options that are currently on sale. The organization has compiled these offerings in an online database (http://goodfoodscorecard.org/entrees/) for chefs who seek to prepare more plant-rich dishes to access and draw inspiration from others' menus. In particular, GFI recommends that chefs consider innovative ways to modify familiar dishes like burgers or wraps, replacing meat and dairy with alternatives like tofu, seitan, or Quorn, or preparing more popular yet inherently plant-based dishes, like falafel or mixed salad bowls served on a bed of grains (Good Food Institute 2019).

Further reading

Good Food Institute. 2019a. "How to Win at Plant-Based: Toolkit." http://goodfoodscorecard.org/creating-entrees.

Good Food Institute. 2019b. "Plant-Based Entrées." http://Goodfoodscorecard.Org/Entrees/.

Hoek, A.C., P.A. Luning, P. Weijzen, W. Engels, F.J. Kok, and C. de Graaf. 2011. "Replacement of Meat by Meat Substitutes: A Survey on Person- and Product-Related Factors in Consumer Acceptance." *Appetite* 56 (3): 662–73. https://doi.org/https://doi.org/10.1016/j.appet.2011.02.001.

Schösler, H., and J. de Boer. 2018. "Towards More Sustainable Diets: Insights from the Food Philosophies of 'Gourmets' and Their Relevance for Policy Strategies." *Appetite* 127: 59–68. https://doi.org/https://doi.org/10.1016/j.appet.2018.04.022.

PRD1 INTRODUCE ONE PLANT-RICH DAY PER WEEK, WHEN ALL THE DISHES SERVED ARE PLANT-RICH ONLY

In more detail:

Introducing one "plant-rich day" per week, where no or limited meat is served to diners, can influence food choice by directly restricting the options available. The benefit of this approach is that it can mirror the eating patterns that many diners are already adopting—choosing to cut down on their meat intake on certain days of the week, or only eat it on weekends—in an attempt to reduce their environmental footprint or to improve their health (Lacroix and Gifford 2019). Offering plant-rich-only menus also means that diners do not have to think too hard, or use too much willpower, when trying to reduce the amount of meat that they are eating by, for example, actively controlling portion sizes or avoiding the tempting meat dishes on offer. Other approaches, such as promoting a plant-rich option while keeping meat on the menu, can encourage trial without restricting choice.

What you can do:

Consider introducing one plant-rich day per week in your operations, following well known examples such as "Meat Free Monday" (Meat Free Monday 2019) or "Meatless Monday" (Meatless Monday 2019.) These campaigns are based on research showing that people are more likely to eat healthier on Monday because they see this day as a "fresh start" or as a day to compensate for a weekend of overeating. (An 2016; Haines et al. 2003). An alternative approach is to offer entirely plant-rich meals within a single day (e.g., plant-rich meals at either breakfast, lunch, or dinner). Given that research suggests diners have a tendency to eat more protein and fat at lunch and dinner than at breakfast, offering plant-rich-only meals later in the day may lead to bigger reductions in GHG emissions (Horgan et al. 2019; Reichenberger et al. 2018).

Introducing exclusively plant-rich days can sometimes create pushback from diners who resist having their full range of choices taken away, even if only temporarily. To overcome this, consider ways to selectively promote the benefits of the plant-rich options you are serving (see PRS1) and focus on expanding, not limiting, food options, or even make no mention of these changes at all (e.g., one good example of how to do this is the "Green Mondays" campaign, which avoids drawing attention to the removal of meat) (Green Monday 2019). Offering a wide variety of great-tasting plant-based dishes should offer your diners sufficient temptation and choice that they don't feel their options are restricted (see PRD5 for more pointers on how to do this well).

Case study:

The Helsinki School District experimented with introducing a "vegetarian day" across 33 school cafeterias, while 10 additional schools retained their regular lunch menu. Researchers investigated the effect of serving only plant-rich dishes on the numbers of students who chose to eat in the school, the amount of food that students served themselves, and the amount that was left over (i.e., plate waste) at the end of their lunch break. Comparing schools that did to those that did not introduce the vegetarian day, researchers discovered that serving only plant-rich dishes proved unpopular in the short term—reducing the number of students who ate in the cafeteria, with less food served and more wasted at the end of their meal. However, after this initial adjustment period, students were more accepting of the change, with no differences seen in the amount of food taken and the amount of plate waste between schools that did versus those that did not introduce vegetarian days in the medium term. Moreover, researchers also reported some evidence of a positive "spillover" effect, where schools introducing a vegetarian day saw students voluntarily selecting more vegetarian meals on other days of the week, up from 11 to 15 percent (Lombardini and Lankosi 2013).

Further reading

Green Monday. 2019. Restaurant Program. https://greenmonday.org/restaurants/.

Lombardini, C., and L. Lankosi. 2013. "Forced Choice Restriction in Promoting Sustainable Food Consumption: Intended and Unintended Effects of the Mandatory Vegetarian Day in Helsinki Schools." *Journal of Consumer Policy* 26: 159–78.

Meat Free Monday. 2019. "One Day a Week Can Make a World of Difference." https://www.meatfreemondays.com/.

Meatless Monday. 2019. "Start a Campaign." https://www.meatlessmonday.com/start-a-campaign/.

PRD4 IMPROVE THE APPEARANCE OF PLANT-RICH DISHES

In more detail

How a dish looks will have a significant influence on whether a diner chooses that option. In food service, and particularly self-service, diners make decisions about what to eat very rapidly. For this reason, it is important that a dish or product be visually appealing and able to win attention away from competing options. Appearance should also suggest that an item is a high-quality option (Clement et al. 2015).

Color is a particularly important contributor to the visual appeal of a dish or product and is a feature that diners can use to predict how flavorful an item will be. Research into the impact of food color on diners' beliefs and preferences has produced some interesting findings—for example, green foods are linked with the idea of "lower energy content," red foods increase a customers' desire to eat, bright yellow foods are experienced as less sour and less sweet, white foods are presumed to be salty, glossy colors denote freshness, and more intense colors are interpreted as signs of stronger flavors (Spence 2015; Foroni et al. 2016; Milosavljevic et al. 2012).

What you can do:

To sell more plant-rich dishes to your customers, consider ways to showcase the vibrant natural colors and unique forms of fruit and vegetables. You may consider setting up appealing arrangements of plant ingredients near self-service displays and adding bright, colorful, and novel garnishes (e.g., an edible flower) that will catch a diner's eye. If you sell packaged plant-rich products in self-service displays (e.g., sandwiches, salads), you could consider modifying the design of this packaging to minimize the amount of fine print that diners need to read. Research tells us that the information included on products is rarely read, with the average customer only absorbing about 8–10 lines of text during a typical shopping trip (Cohen and Babey 2012). Pictures, colors, and shapes are therefore far more important influences on what food is chosen.

Case study:

A group of Belgian researchers worked with a catering company serving staff and students at the University of Ghent to see whether enhancing the attractiveness of their plant-rich dishes would influence demand for these options. Researchers worked with cafeteria staff to make plant-rich dishes more appealing by emphasizing the idea of naturalness (e.g., serving on a wooden plate) and highlighting plant-based ingredients by surrounding this dish with evocative items (e.g., an olive oil flask and fresh peppers). Measuring the number of diners who selected the plant-rich options before and after these elements were added showed that sales increased by an average of approximately five percentage points (Rubens 2017).

Further reading

Rubens, K. 2017. "A Nudge in the Green Direction." *Behavioral Economics*, January 23. https://www.behavioraleconomics.com/a-nudge-in-the-green-direction/.

PRD5 INCREASE THE VARIETY OF PLANT-RICH DISHES ON OFFER

In more detail:

Research shows that diners are influenced by the variety of food on offer. More choice within a given category increases the likelihood that diners will select a dish from that category because there is greater chance they will find something they really want to eat (Parizel et al. 2017; Bucher et al. 2011). However, care needs to be taken when applying this intervention, as too much choice can overwhelm diners' ability to make a clear decision on what they want. This is thought to be because weighing up lots of options takes mental effort, which can leave people feeling overwhelmed. When in this state, diners are more likely to rely on easy and attention-grabbing features (like brand names and colorful packaging), which can lead them to make less than optimal choices (Smith and Krajbich 2018). Offering too many options can also leave diners feeling less satisfied with the selection they finally make (Dar-Nimrod et al. 2009).

What you can do:

Increase the range of plant-rich dishes served in your establishment. Consider serving various types of dishes (e.g., a plant-rich salad, burger, soup, and a pasta dish) rather than variations on the same type of dish (e.g., four flavors of vegetarian soup). This intervention can be combined with PRD6, in which more and a greater variety of plant-rich dishes are proposed, although variety can be increased while keeping the total number of plant-rich dishes the same. You may wish to consider drawing influences from global cuisines that serve a wide range of plant-rich dishes, like Middle Eastern, South East Asian, or Indian (Sengupta 2019). Another option may be to offer diners many smaller portions of multiple dishes, so they can sample a range of different plant-rich options without needing to choose between them. If you are worried about overwhelming your customers, consider gradually phasing in a greater variety of plant-rich dishes rather than introducing lots of new options at once. This will give diners time to familiarize themselves with and develop a taste for the plant-rich dishes you are serving.

Case study:

Researchers at the University of Copenhagen set up an experimental buffet to test whether increasing the variety of dishes on offer would influence the amount of plant-rich foods selected. Researchers first asked a group of diners to serve themselves from a buffet that contained a mixed white salad, a mixed red salad, salsa, rice, and chili con carne. After that, they changed the buffet, splitting out the salad ingredients into separate bowls so that diners could serve themselves and mix ingredients as they wanted, thus increasing the perceived variety of the salad options available. Compared to the first group of diners, the second group who had greater perceived variety of salad ingredients ate significantly less of the meat-based chili con carne (15 percent less per person) and less rice (17 percent less per person) but more salad (4 percent more per person) (Friis et al. 2017).

Further reading

Bucher, T., K. van der Horst, and M. Siegrist. 2011. "Improvement of Meal Composition by Vegetable Variety." *Public Health Nutrition* 14 (8): 1357–63. https://doi.org/DOI: 10.1017/S136898001100067X.

Friis, R., L.R. Skov, A. Olsen, K.M. Appleton, L. Saulais, C. Dinnella, H. Hartwell, et al. 2017. "Comparison of Three Nudge Interventions (Priming, Default Option, and Perceived Variety) to Promote Vegetable Consumption in a Self-Service Buffet Setting." *PLoS ONE* 12 (5): 1–16. https://doi.org/10.1371/journal.pone.0176028.

PRD6 INCREASE THE RELATIVE NUMBER OF PLANT-RICH DISHES ON OFFER

In more detail:

The context in which diners choose which foods to buy can have a big influence on their decision-making. Diners use information from the surrounding environment, often unconsciously, to draw conclusions about how desirable a dish or product is compared to others on offer (Bianchi et al. 2018a; Clement et al. 2015).

Increasing the number of plant-rich dishes compared to meat dishes can shift diners' choices for a number of reasons. First, it increases the likelihood that diners will notice the plant-rich dishes on offer. Second, repeated exposure to a given item has been proved to increase preferences toward it. This is because the more we see something, the more we tend to like it—a phenomena known as the "familiarity effect" (Cohen and Babey 2012). Third, by increasing the relative number of plant-rich dishes on offer compared to meat dishes, diners have greater choice, meaning there is a higher chance that they will find a plant-rich option that satisfies their expectations and preferences (Rioux et al. 2018).

What you can do:

Alter the ratio of plant-rich to meat dishes on offer in your establishment. For example, if you currently sell two plant-rich main dishes and five meat main dishes, consider changing this ratio to 5:2 plants:meat. For ideas on which dishes to add to your offering, see recommendation PRD5. See PLC3 and PRS2 for guidance on how to present these options to increase the likelihood that the dishes will be chosen.

Case study:

In a series of experiments conducted by researchers at the University of Cambridge, the impact of doubling the availability of vegetarian options (from 1 out of 4 dishes on the menu to 2 out of 4) on food sales was tested in three university cafés. Analysis of data from this study showed that vegetarian dish sales increased by 70 percent, and meat sales decreased, when more of these options were available to diners. In turn, this led to a substantial reduction in each cafeteria's GHG emissions from food. Owing to the success of this approach, many other dining establishments at the University of Cambridge have since chosen to include a higher ratio of plant-rich options on their menus (Garnett et al. 2019).

Further reading

Garnett, E., A. Balmford, C. Sandbrook, M.A. Pilling, and T.M. Marteau. 2019. "Impact of Increasing Vegetarian Availability on Meal Selection and Sales in Cafeterias." *Proceedings of the National Academy of Sciences* 116 (42): 20923–29.

PRD7 INTRODUCE PLANT-RICH ALTERNATIVES TO POPULAR MEAT DISHES

In more detail:

When asked why they eat meat, many people say they love the taste, that eating it is a part of their normal routine, and that this is a habit they simply do not want to change (Rees et al. 2018). These justifications reflect the fact that familiarity drives much of our decision-making on what to eat, with a strong drive toward foods that have been tried many times before and that are known to be satisfying (Lacroix and Gifford 2019). With this in mind, offering diners a choice between their normal meat-based favorites and very similar (but plant-rich) alternatives is one way to encourage a shift in food choices. Meat substitutes that look, taste, and smell like meat offer diners their "normal" and preferred choice, in a form that is significantly better for the environment (Schösler et al. 2012).

What you can do:

Consider offering your diners tasty and appealing plant-rich versions of the most popular meat dishes on your menu. Plant-based sausages, burgers, or mince should be offered alongside their meat-based counterparts, encouraging diners to see them as viable alternatives to their regular choices. De-emphasize the fact that these options contain little to no meat. Instead, promote their unique benefits, highlighting positives such as improved taste.

Case study:

In April 2019, the international fast food chain Burger King announced that it was rolling out a trial of the plant-based "Impossible Burger" across 59 sites in and around St. Louis, Missouri (United States). The Impossible Burger, manufactured by the company Impossible Foods, is a plant-based burger specially designed to look, smell, and taste just like meat. The key to the Impossible Burger's authenticity is the addition to the patties of the ingredient heme, derived from genetically engineered yeast, which gives the burger a distinct meaty taste. By the end of April 2019, Burger King announced that its trial had been a success, reporting that restaurants in St. Louis pulled in 19 percent higher foot traffic than the company's national average during the trial period. These figures led the company to trial the Impossible Burger nationwide in the United States (CNBC 2019). Competitors of Burger King have followed suit, with McDonald's launching a Nestlé-produced vegan burger, the "Big Vegan TS," in May 2019 in Germany, one of its leading international markets (CNN Business 2019).

Further reading

CNBC. 2019. "Impossible Whopper Boosted Burger King Traffic by 18%, Report Says." May 28. https://www.cnbc.com/2019/05/28/impossible-whopper-boosted-burger-king-traffic-by-18percent-report-says.html?mc_cid=37f1cbda8f&mc_eid=f3d0a91d99.

CNN Business. 2019. "McDonald's Joins the Meatless Burger Trend in One of Its Biggest Markets." May 8. https://edition.cnn.com/2019/05/07/business/mcdonalds-meatless-burger-germany/index.html.

PLACEMENT INTERVENTIONS

The two prioritized Placement interventions outlined here describe how best to display food in self-service buffets or on shelves to encourage more diners to select the plant-rich option.

PLC1 MAKE SELF-SERVICE PLANT-RICH FOOD DISPLAYS MORE ENGAGING

In more detail:

While attracting diners' attention with eye-catching displays is a great way to boost demand for plant-rich foods, food service providers can also do well with techniques that stimulate the four remaining senses of sound, taste, touch, and smell. Information that diners receive from these senses can help arouse their interest and influence their emotions (Chebat and Michon 2003). Background music, tempting textures, and mouthwatering odors can all help create an engaging, multisensory dining experience, as can showcasing how plant-rich dishes are prepared. Open kitchens or food preparation stations can demonstrate to the diner the amount of effort and skill involved in creating plant-rich dishes, influencing their impressions of dish quality and elevating these choices to a higher status (Krishna 2012).

What you can do:

Think of ways to make your dining area and food displays more multisensory. Plant-rich food stations, where food is cooked in front of diners, not only allow them to see how their dishes are made and build anticipation for eating them but also give chefs the chance to interact with diners directly, to discuss the benefits of plant-based ingredients and offer diners samples to try before they buy. You may wish to give diners the choice to pick and choose their own plant-based ingredients and allow chefs to compile and cook this unique blend right in front of them. Pick-your-own salad gardens that allow diners to harvest their own greens or herbs can also boost the appeal of these plant-based ingredients, while ensuring diners access to fresh and natural products in a unique and memorable way.

Case study:

In a lab-based study on food choice conducted by Heriot Watt University, participants were asked to select one of two types of savory snack—Indian samosas or Malaysian popiahs—while either Indian or Malay music was played in the background. When counting the numbers of each snack taken by participants at the end of the lunch period, researchers found that samosas were chosen significantly more frequently when Indian music was played, while popiahs were more likely to be chosen when Malay music was on in the background! The authors of this study argue that background music can influence food choice by "priming" diners to think about the corresponding culture, which influences their decision-making when foods are presented (Yeoh and North 2010).

Further reading

Yeoh, P., and A. North. 2010. "The Effect of Musical Fit on Choice between Two Competing Foods." *Musicæ Scientiæ* 9 (1): 165–80.

PLC3 INCREASE THE AMOUNT OF A SELF-SERVICE DISPLAY THAT IS DEDICATED TO PLANT-RICH DISHES

In more detail:

The phrase "Looking is buying" sums up findings from research into the best ways to arrange food displays to influence diners' choices (Gidlöf et al. 2017). Evidence shows us that the more attention given to a particular option, the greater the chance it will be bought (Smith and Krajbich 2018). Increasing the number of options on sale within a given category, like plant-rich, is one way to attract more attention (see PRD6 and PRD5 for examples of how to do this), as are other approaches that result in plant-rich options taking up more of a diner's visual field. These include spacing plant-rich products out more, positioning them more prominently than meat products in a display (e.g., in a buffet or on shelves), or extending plant-rich product display areas into surrounding spaces.

What you can do:

Increase the amount of space that plant-rich dishes take up in buffet sections or in shelf displays and consider ways to distribute plant-rich dishes and products across display areas where meat-based options are available. This not only will ensure that plant-rich items take up more space but also will keep meat-eating diners from bypassing a section on display as "vegan and vegetarian." Ensure the increased display areas for plant-rich options are also visually attractive. Avoid clutter, which discourages choice (Scheibehenne et al. 2010). For further ideas on how to improve the appearance of plant-rich dish displays, see PRD4.

Case study:

Responding to growing demand for plant-rich options at the campus of Seattle Pacific University, food service provider Sodexo decided to expand its display of these options. Sodexo doubled the size of its plant-rich food station, spreading existing options into neighboring display areas and adding new menu items. The team also decided to change how it marketed the food in this section, rebranding the station as "Avant Garden" to appeal to meat eaters as well as vegetarian and vegan diners, showcasing and highlighting the locally grown food in this display to draw more attention to it. In the semester following these changes, participation at the Avant Garden station increased to 28 percent from a baseline of 19 percent the semester before.

Further reading

Gidlöf, K., A. Anikin, M. Lingonblad, and A. Wallin. 2017. "Looking Is Buying: How Visual Attention and Choice Are Affected by Consumer Preferences and Properties of the Supermarket Shelf." *Appetite* 116: 29–38. https://doi.org/10.1016/j.appet.2017.04.020.

PRESENTATION INTERVENTIONS

The design and layout of menus can have an important influence on what people choose to eat when dining away from home. Here we describe four Presentation interventions that recommend ways to engineer menus to encourage more diners to select plant-rich dishes.

PRS1 USE LANGUAGE ON MENUS TO EMPHASIZE THE POSITIVE ATTRIBUTES OF PLANT-RICH DISHES

In more detail:

Language can play an important role in creating desire for plant-rich dishes when used well. Research shows that certain types of language are better than others at enticing diners toward plant-rich dishes, with words that emphasize taste and indulgence, or that highlight interesting or exotic origins, proving particularly effective. Another powerful approach is to use descriptive language that helps diners evoke the look and feel of plant-rich dishes, allowing them to create tempting images in their minds when making a selection (Lockyer 2006). For each type of appealing language, using the right words can creative positive expectations about a plant-rich dish that not only enhance motivation to select it but also influence the diner's perception of how the dish will taste (Wansink et al. 2005; Papies 2013). Even more interesting is the fact that descriptive words have been shown to affect our physiology directly, with appealing language creating watering mouths in anticipation, as well as affecting levels of the body's hunger hormone, ghrelin, which plays an important role in controlling appetite (Crum et al. 2011; Keesman et al. 2016; Forwood et al. 2013).

What you can do:

Rename the plant-rich dishes you offer using words that highlight the flavor or provenance of the dish or the eating experience. Consider involving your team in generating new and interesting names—particularly the chefs who work with ingredients daily and have intimate knowledge of the look, feel, taste, and preparation techniques involved in the plant-rich dishes that you sell. While adding language highlighting the positive attributes of a dish, also consider removing language that may suppress sales of plant-rich options (see PRS4).

Case study:

WRI ran a trial with the U.S.-based restaurant chain Panera to find out whether a series of simple changes to the language used on its menus and signs could influence sales of one of its plant-rich options, "Low Fat Vegetarian Black Bean Soup". Panera worked with WRI to develop more appealing names for this dish, eventually opting to test "Slow Simmered Black Bean Soup," which showcases the flavor and care taken in preparing the soup, and "Cuban Black Bean Soup," to reflect the dish's heritage. These new names were tested in 40 cafés across two regions of the United States over a two-month period in 2018, with language changes made across all ordering channels, including menu panels, mobile, online, in-café kiosk, and drive-thru. When comparing this test period to the same period the year before, results showed that switching to the name "Slow Simmered Black Bean Soup" in the first market had no effect on soup sales, but the name "Cuban Black Bean Soup," used in the second market, resulted in a statistically significant 13 percent increase. These results highlight how important it is to use the right language when promoting plant-rich dishes, and that when this is identified, words can have an important effect on customer demand (Vennard 2019).

Further reading

Turnwald, B.P., D.Z. Boles, and A.J. Crum. 2017a. "Association between Indulgent Descriptions and Vegetable Consumption: Twisted Carrots and Dynamite Beets." *JAMA Internal Medicine* 177 (8): 1216–18. doi:10.1001/jamainternmed.2017.1637.

Vennard, D. 2019. "Q&A: How a Cuban Name Change Boosted Panera's Soup Sales." World Resources Institute. https://www.wri.org/blog/2019/02/qa-how-cuban-name-change-boosted-paneras-soup-sales.

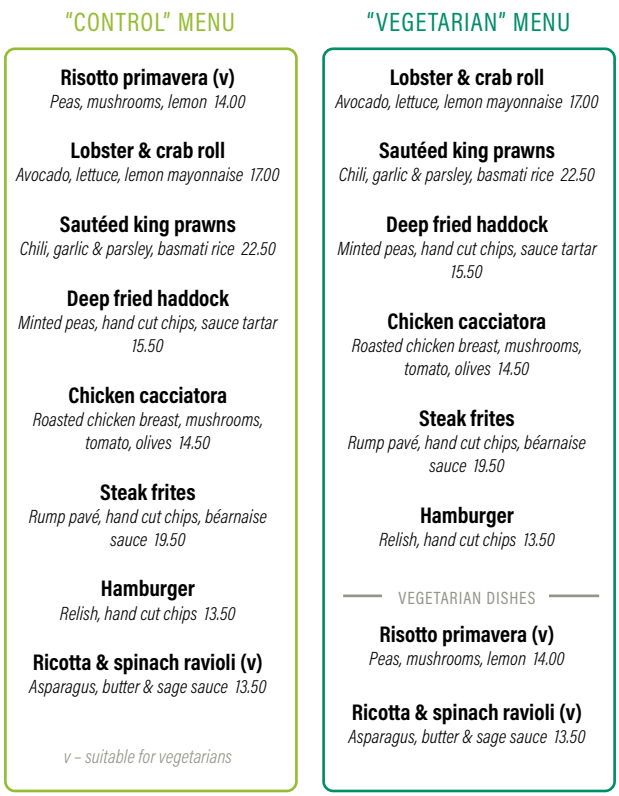
Vennard, D., T. Park, and S. Attwood. 2018. "Encouraging Sustainable Food Consumption by Using More-Appetizing Language." Technical note. World Resources Institute. https://www.wri.org/publication/encouraging-sustainable-food-consumption-using-more-appetizing-language.

PRS2 LIST PLANT-RICH DISHES IN THE MAIN BODY OF A MENU, NOT IN A SEPARATE "VEGETARIAN" BOX OR "SPECIALS" SECTION

In more detail:

Contrary to the prevailing belief that highlighting certain dishes using boxed or framed sections on menus will increase their appeal to diners (Ozdemir and Caliskan 2015), recent research has found that positioning plant-rich dishes in a separate "Vegetarian Specials" section actually reduces the likelihood that these options will be ordered (Bacon and Krpan 2018). It seems that, rather than attracting diners' attention, boxes are used as a way for those who are not vegetarian or vegan to rapidly screen out these options. It is possible that diners who do not follow a meat-free diet presume that any option listed in a "Vegetarian Specials" box is not for them, so they quickly move on to more relevant areas of the menu.

Figure 5 | Plant-Rich Dishes Listed in a "Vegetarian Specials" Section and Integrated into the Full Menu



Source: Bacon and Krpan (2018).

What you can do:

Do not list plant-rich dishes in separate "Vegetarian Specials" or "Vegetarian Choices" boxes or areas on your menu. Instead, integrate these options alongside other meat and fish dishes that you offer. You may even want to move plant-rich options to the top of a menu rather than positioning them in the middle of a list, where they are less likely to be chosen (Policastro et al. 2015).

Case study:

In a recent study conducted at the London School of Economics, researchers tested the effect of placing meat-free dishes inside versus outside of a "Vegetarian Dishes" box on a restaurant menu (Figure 5). They showed 380 participants two different versions of an online food menu—one with the vegetarian dishes separated into their own section and one with these dishes integrated into the rest of the menu—and asked subjects to indicate which dish they would select if they were dining out in this restaurant. Results showed that participants were less likely to select either the vegetarian risotto or the ricotta and spinach ravioli when these were placed in the "Vegetarian Dishes" box than when they were placed first and last on the full menu—only 6 percent chose either vegetarian option when these were separated from other dishes, versus 13 percent when these were integrated into the full list (Bacon and Krpan 2018).

Further reading

Bacon, L., and D. Krpan. 2018. "(Not) Eating for the Environment: The Impact of Restaurant Menu Design on Vegetarian Food Choice." *Appetite* 125: 190–200. https://doi.org/10.1016/J.APPET.2018.02.006.

PRS3 USE LANGUAGE ON MENUS TO RECOMMEND PLANT-RICH DISHES

In more detail:

Highlighting a single plant-based dish as the recommended choice on menus, signs, or screens is a good way to attract attention to that option (Gidlöf et al. 2017). Adding a menu recommendation, particularly from an expert source (e.g., "Chef's Recommendation") can help diners filter through a multitude of options (dos Santos et al. 2019). A recommended choice may also allow diners to bypass the process of weighing very similar pros and cons for different dishes (Shah and Oppenheimer 2008), and can leave them feeling more certain that they have made a "good" choice that is reinforced by the opinion of another person. Note, however, that the research in support of this approach is currently mixed, with fewer studies available that indicate recommendations do influence food choice than those showing recommendations have no effect (Broers et al. 2019; dos Santos et al. 2019; Zhou 2019).

What you can do:

Consider running a short trial that highlights a selected plant-rich dish as the "Dish of the Day," "Chef's Recommendation," "Daily Recommendation," or "Owner's Choice." Make this recommendation clearly visible to diners at the time when they are making their choice and ensure it is integrated into regular menus and signs, rather than listed on a separate specials board, where it could be easily overlooked. There is currently relatively little research on the best way to present this kind of recommendation, but suggestions include highlighting the recommended dish in bolder or larger font, in different colors, or accompanied by an appealing image (Ozdemir and Caliskan 2015). You may also wish to back up any written recommendations by asking staff to clearly indicate to diners the recommended option on the menu before they place their order (see PPL6).

Case study:

A group of researchers from the Université Catholique de Louvain in Belgium tested the effect of recommending a novel plant-rich dish—salsify and turmeric soup—on sales of that item in two university canteens. While not specifically a study exploring interventions to encourage diners to shift away from choosing meat, researchers were interested in whether highlighting an unfamiliar plant-rich dish as a "suggestion of the chef" would encourage diners to overcome their aversion to trying this new option. Comparing lunchtime soup sales over five days when the chef's suggestion was listed on menu boards and dish labels to five days when only the soup's ingredients were shown, researchers found that the chef's suggestion led to a significant increase in numbers selecting the salsify soup. The average daily percentage of salsify soups sold when labeled as the chef's suggestion was 17.2 percent, compared to just 9.7 percent when only soup ingredients were listed on signs and dish labels (Broers et al. 2019).

Further reading

Broers, V.J.V., S. van den Broucke, C. Taverne, and O. Luminet. 2019. "Default-Name and Tasting Nudges Increase Salsify Soup Choice without Increasing Overall Soup Choice." *Appetite* 138: 204–14. https://doi.org/https://doi.org/10.1016/j.appet.2019.03.027.

dos Santos, Q., F.J.A. Perez-Cueto, V.M. Rodrigues, K. Appleton, A. Giboreau, L. Saulais, E. Monteleone, et al. 2019. "Impact of a Nudging Intervention and Factors Associated with Vegetable Dish Choice among European Adolescents." *European Journal of Nutrition*, February. https://doi.org/10.1007/s00394-019-01903-y.

PRS4 REMOVE UNAPPEALING LANGUAGE FROM MENUS

Why this works:

The language that we use to describe food can have a powerful influence on our subsequent experiences of it. Research shows that certain language works particularly well to evoke mental simulations (or "mental images") of what a dish will be like to eat. If these simulations are positive, they can tempt diners toward the described option (Papies 2013). Yet research shows that words most commonly used to describe plant-based dishes—terms like *healthy* or *light* or *low-calorie*—don't work very well at motivating diners to choose these options (Turnwald and Crum 2019). For example, research by World Resources Institute (WRI) shows that terms highlighting the absence of meat in a dish—*vegetarian*, *vegan*, or *meat-free*—are particularly unappealing to most people. In communicating with those who don't follow these diets, it seems to be better to avoid using language that calls out the fact that a dish does not contain meat (Vennard et al. 2018).

What you can do:

When describing the plant-rich options on your menus, signs, or food labels, remove language that emphasizes the lack of meat in a dish. Words like *vegetarian*, *vegan*, and *meat-free* tend to be unpopular among those who have not excluded meat from their diets. There is, however, currently too little research to recommend whether using vegetarian symbols (e.g., a green *V*) is a better option, but, as these symbols are generally smaller, unobtrusive, and may only be noticed by those actively looking for them (e.g., vegetarian and vegan diners), this might be a better approach to communicate that a plant-rich dish is indeed meat-free (Vemula et al. 2014). When you do wish to use the terms *vegetarian* or *vegan*, we recommend that these not be included in main titles but instead placed in subdescriptions. If you are wondering what to replace these words with, take a look at intervention PRS1 or consider using basic descriptions of a dish's ingredients so these are unambiguous to your diners.

Case study:

WRI worked with the UK food retailer Sainsbury's to explore the impact of changing the language used to describe plant-rich dishes on offer in its supermarket cafés. Over a period of eight weeks, new, appealing descriptive language to describe the vegetarian and vegan dish options was introduced on menus in 18 sites, while 10 other cafés kept original dish names that included terms like *meat-free* and *vegetarian*. Analysis of sales data from before and after names were changed showed that removing language that highlighted the lack of meat in a dish and replacing this with more attractive names significantly boosted plant-rich dish sales, with increases of up to 76 percent seen for one of the dishes, a meat-free sausage and mash more evocatively renamed as "Cumberland Spiced Veggie Sausage and Mash" (Bacon et al. 2018). Other descriptive names produced shifts in the number of plant-rich dishes sold of between -4.7 percent and +51 percent, underscoring the importance of choosing descriptive language that can evoke positive expectations in the minds of diners.

Further reading

Bacon, L., J. Wise, S. Attwood, and D. Vennard. 2018. "The Language of Sustainable Diets: A Field Study Exploring the Impact of Renaming Vegetarian Dishes on U.K. Café Menus." Technical note. World Resources Institute. https://www.wri.org/publication/language-sustainable-diets.

Turnwald, B.P., D. Jurafsky, A. Conner, and A.J. Crum. 2017b. "Reading between the Menu Lines: Are Restaurants' Descriptions of 'Healthy' Foods Unappealing?" *Health Psychology*. Advance online publication. http://dx.doi.org/10.1037/hea0000501.

Wise, J., and D. Vennard. 2019. "It's All in a Name: How to Boost the Sales of Plant-Based Menu Items." World Resources Institute. https://www.wri.org/news/its-all-name-how-boost-sales-plant-based-menu-items.

PROMOTION INTERVENTIONS

Here we describe four prioritized Promotion interventions that focus on how promotional strategies, publicity materials, and pricing strategies can influence diners to choose more plant-rich dishes.

PRM1 OFFER DINERS FREE SAMPLES OR TASTE-TESTING EVENTS FOR PLANT-RICH DISHES

In more detail:

Giving diners free samples of plant-rich dishes to try before they buy is a good way to introduce them to new options, allowing them to find out whether they like a dish before committing to a full meal. Research shows that repeatedly tasting a sample can increase diners' liking of it (Lakkakula et al. 2010)—another good example of the "familiarity principle" in action: repeated exposure to a particular food leads us to like it more, even if we initially find it unappealing (Wardle et al. 2003). Another possible reason why free samples of plant-rich foods may increase the numbers who choose them is that they make the positive attributes of the sample dish—the smell, taste, and texture—more prominent in the diner's mind, acting as cues that are triggered when the opportunity to choose finally arises (Lammers 1991).

What you can do:

Offer your customers free samples of plant-rich dishes to try before they buy. You may wish to consider offering tasting plates that contain a variety of smaller portions of plant-rich dishes, allowing diners to test these without committing to a whole meal that they may not be sure they will like. Taste-testing events or food stands are good ways to engage diners with a new dish or product and give your staff an opportunity to try out other interventions listed in this guide—like applying the principles from PRS1 or attracting diners' attention through techniques described in PLC1.

Case study:

An elementary-middle school in Vermont introduced students to four new dishes, including a plant-rich vegetable stew, by giving them taster portions the day before each was sold as the main lunch meal. Over the course of one month, researchers found that providing free samples led to a significant increase in the percentage of students who chose the target dish during lunch the next day (e.g., vegetable stew sales went up by 8.5 percent) and a decrease in numbers choosing other options (down by 10.4 percent) (Pope et al. 2018). Similarly, a study conducted at a school in London found that giving students free samples of sweet red pepper each day led to a significant increase in how much they reported liking this vegetable over time. Researchers note that the amount of red pepper that each child voluntarily ate per day increased significantly, from just over one piece at the first test session to more than nine pieces at the last session (Wardle et al. 2003), suggesting this is a powerful way to boost demand.

Further reading

Pope, L., E. Roche, C.B. Morgan, and J. Kolodinsky. 2018. "Sampling Tomorrow's Lunch Today: Examining the Effect of Sampling a Vegetable-Focused Entrée on School Lunch Participation, a Pilot Study." *Preventive Medicine Reports* 12: 152–57. https://doi.org/10.1016/j.pmedr.2018.09.010.

PRM2 PUBLICIZE THE ENVIRONMENTAL BENEFITS OF PLANT-RICH DISHES USING MARKETING MATERIALS LIKE POSTERS, LEAFLETS, OR TV SCREENS

In more detail:

While there is growing media coverage of the link between the food we eat and its impact on the environment, few customers may be aware of this relationship and its implications for the future of our planet. Moreover, it is unlikely that those who are will recall their anxieties about the threat of climate change when deciding what to eat. At that moment, they are more likely to be driven by hunger or to be rushed or distracted (Marteau 2017). Researchers call this the "hot cold empathy gap," diners' underestimation of the role that physiological drives—thirst, hunger, fatigue—and the environment play in dictating their food choices, and their presumption instead that their decisions are led by "colder" rational factors, like their knowledge of an issue (Nordgren et al. 2006).

The existence of the "hot cold empathy gap" suggests that it is necessary to think about not only what information to communicate to diners but also how and when this should be presented. Messaging on the link between food and environmental risks may have the most impact when presented at the point of decision. If diners' attention is engaged at this vital moment, researchers argue, they will have the opportunity to pause and reflect on their values, before they opt for either a meat- or plant-rich dish. Indeed, some evidence suggests that timely targeting with the right type of information can influence diners' choices in food service settings (Gustafson et al. 2018; Reed et al. 2011). Note, however, that research on this intervention suggests that it may be less effective than other approaches in encouraging a shift in food choice. Moreover, it may prove unpopular with certain groups of diners, especially those who do not hold strong proenvironmental values. The suitability of this intervention will therefore need to be considered in light of your customer base and in the context of your establishment and food offering.

What you can do:

Incorporate more advertising to highlight the environmental benefits of eating more plants and less ruminant meat in your establishment. Ensure that these advertisements are placed where customers will notice them before they order—for example, on menu boards, on signs in front of products, on shelf labels, or at the entrance of the restaurant. Make sure the facts that you are communicating are truthful and relevant to your diners, and think about highlighting the "solutions" that your establishment is engaged in, rather than calling attention to problems that seem too large or futile to tackle (Chapman et al. 2016). Help customers understand the impact of their individual choices on the environment, potentially by communicating the greenhouse gas emissions savings of choosing a specific meat dish rather than a plant-rich alternative.

Case study:

Researchers at the University of Gothenburg in Sweden wanted to test the impact of communicating information about the environmental impact of different dishes sold at the university canteen using color-coded menu labels that summarized the CO_2 equivalents of different items on sale. During an 11-week trial period, vegan, ovo-vegetarian, fish, and poultry dishes were labeled green, while pork dishes and vegetarian dishes that contained considerable amounts of dairy were labeled yellow, and beef or lamb dishes were labeled red. Labels were added to menus in an attempt to catch diners' attention at the decisive moment, with further information displayed at the self-service checkout, the restaurant entrance, and on posters and flyers. Researchers compared dish sales during a five-week period before the labels were introduced to the trial period, finding that sales of green-labeled dishes increased by 5.6 percentage points when the labels were present, while the share of meat dishes sold decreased by 2.4 percentage points when these were labeled red. Overall, this point-of-decision information intervention resulted in an emissions reduction of 3.6 percent (Brunner et al. 2018).

Further reading

Brunner, F., V. Kurz, D. Bryngelsson, and F. Hedenus. 2018. "Carbon Label at a University Restaurant: Label Implementation and Evaluation." *Ecological Economics* 146 (August 2017): 658–67. https://doi.org/10.1016/j.ecolecon.2017.12.012.

PRM3 RUN CROSS-PRODUCT PROMOTIONS ON PLANT-RICH DISHES AND SELECTED DRINKS, SIDE DISHES, OR DESSERTS

In more detail:

Promoting certain dishes alongside complementary products, like a suitable wine, side dish, sauce, or dessert, is a well-known marketing technique used extensively in food service. Cross-product promotions like these can boost sales of plant-rich options by making it easier for diners to choose what to eat in combination (Harris and Blair 2006; Carroll et al. 2018), as well as encouraging diners to associate plant-rich dishes with other high-quality and well-branded products, leading them to transfer their positive perceptions from these to the target plant-rich dish.

What you can do:

If your establishment offers self-service dining, consider displaying plant-rich options alongside paired products in the same area on shelves or in buffets. Another approach is to add signs that recommend options that should be paired together. If you offer only table service, you may consider advertising cross-product promotions using a set plant-rich menu or encourage your service staff to recommend attractive pairings of plant-rich drinks, sides, desserts, or extras to diners.

Case study:

For those hoping to treat their partner to a romantic meal on Valentine's Day but who prefer to eat in rather than out, UK supermarket chain Marks & Spencer has the answer: a Valentine's Day meal for two for just £20. The meal deal bundles together a starter, a main dish, and a dessert option with additional wine or prosecco for two diners. In 2019, the retailer added its first-ever fully plant-based Valentine's meal deal—allowing customers to replace animal-based starters like Gastropub Camembert with Chutney with Vegan Sweet Potato Falafels, or ruminant heavy mains like Boeuf Bourguignon with plant-based Roasted Mushroom Stroganoff. It also enabled them to add meat-free sides, like Tenderstem Asparagus Spears. Cross-promoting vegan products on this menu with animal-based options, and allowing diners to add their choice of white, red, or rosé wine or prosecco enabled Marks & Spencer to reach a broader audience of shoppers and entice those who might not be willing to order from a vegan menu.

Further reading

Carroll, K.A., A. Samek, and L. Zepeda. 2018. "Food Bundling as a Health Nudge: Investigating Consumer Fruit and Vegetable Selection Using Behavioral Economics." *Appetite* 121: 237–48. https://doi.org/https://doi.org/10.1016/j.appet.2017.11.082.

PRM5 ALLOW DINERS TO ADD MEAT TO A PLANT-RICH DISH FOR A SURCHARGE

In more detail:

Presenting diners with a menu that is plant-rich but allows them to add meat for a surcharge is likely to influence dish choices given the tendency to favor the "default" choice over alternatives (Campbell-Arvai et al. 2012). This effect, known as "status quo bias," is thought to occur because diners either do not realize when different options are available or are not willing to make the effort to seek out alternatives. Another good reason to offer meat at an additional surcharge is that this approach can make the additional cost of this ingredient more obvious to diners. This taps into a phenomenon commonly discussed in relation to human decision-making; that is, loss aversion: people find it painful to spend money unnecessarily, a discomfort often greater than the anticipated pleasure of adding meat to their meal (Radnitz et al. 2018).

What you can do:

Offer diners the option to add beef, lamb, or other meats to plant-rich dishes at an additional cost, making it clear that the meat component is an extra not included in the base price. You may want to provide a menu that contains only plant-rich options by default, with meat additions included in a separate "Added Extras" section, or highlight the meat dishes available on a separate menu board, meaning that diners need to actively seek out this information if they wish to include meat in their dish. Finally, consider offering different meats on a sliding price scale, with those that produce the most greenhouse gas emissions priced higher than lower-emitting alternatives.

Case study:

A team of researchers at Radboud University in the Netherlands set up an online study of the impact of a vegetarian-only menu that enabled diners to add meat to a dish at extra cost. In this study, participants saw different versions of restaurant menus and were asked to select which dish they would eat. One version of each menu contained options that were all vegetarian but to which diners could add meat for an extra cost. Other menu versions contained both meat and vegetarian dishes. The researchers found a significant difference between the different menu types in the numbers of people who chose the vegetarian option. Of the 245 participants, 73.2 percent selected a vegetarian option when this was presented as the default choice with meat at an extra cost, compared to 43.8 percent when menus included both vegetarian and meat dishes (de Vaan 2018).

Further reading

Campbell-Arvai, V., J. Arvai, and L. Kalof. 2012. "Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision." *Environment and Behavior* 46 (4): 453–75. https://doi.org/10.1177/0013916512469099.

de Vaan, J. 2018. "Eating Less Meat: How to Stimulate the Choice for a Vegetarian Option without Inducing Reactance?" Master's thesis. Faculteit der Sociale Wetenschappen, Radboud University.

PEOPLE INTERVENTIONS

Staff working in food service establishments play a key role in influencing which dishes diners order. In this section we outline six People interventions that provide staff with the knowledge, skills, tools, and motivation to encourage diners to choose plant-rich dishes.

PPL1 PROVIDE CHEFS AND FOOD PREPARATION STAFF WITH INFORMATION ABOUT THE HEALTH AND ENVIRONMENTAL BENEFITS OF PLANT-RICH DISHES

In more detail:

Even though they do not interact with diners directly, back-of-house food preparation staff are still able to influence diners' choices by creating appealing and tasty plant-rich options that will entice them away from meat. Yet many back-of-house staff are not aware of the environmental impacts of different types of food or do not realize the important role they can play in boosting demand for plant-rich options. Supplying those who plan your menus and prepare your dishes with facts about the benefits of plant-rich foods may motivate them to engage with and contribute to this important agenda (Mullee et al. 2017).

What you can do:

Run an educational session or direct your back-of-house staff to good websites, videos, or articles that explain the link between plant-rich diets and the environment. To motivate your back-of-house staff to engage with this agenda, consider ways to make these issues more personally relevant to them. For example, find ways to encourage chefs and food preparation staff to reflect on and measure the environmental impact of their own dietary choices (Sussman et al. 2016). Pictures and diagrams are good ways to get points or headline statistics across clearly. Another is to pair the information you give your staff with clear and actionable "next steps" that they can take right away. Including this type of practical guidance helps move people from just thinking about the facts to making changes because of them.

Case study:

The chef team at the University of Winchester, based in the United Kingdom, has been focusing on plant-rich food for several years. To help the team better understand how to produce appealing tastes, flavors, and textures when cooking with more environmentally friendly plant-based ingredients, the Humane Society held a skills and education day for both the production team and outlet supervisors. Following this training, chefs were even more conscious of the need to develop great-tasting plant-rich meals for those following a vegan diet and their "flexitarian" customers, meat eaters actively trying to reduce their intake. As a result, the team went on to develop its own in-house book of plant-rich dishes, with copies given to students and staff so they could learn more about the benefits of plant-rich dishes and try out recipes at home. This approach not only helped improve chef and diner awareness of plant-rich diets but also helped engage more diners with the wide variety of plant-rich options available around campus.

PPL2 TRAIN CHEFS AND FOOD PREPARATION STAFF IN HOW TO COOK AND PREPARE PLANT-RICH DISHES

In more detail:

Multiple factors influence which foods diners choose to buy; unsurprisingly, one of the most important is whether a dish tastes good (Turnwald and Crum 2019). For this reason, it is essential that back-of-house staff, like chefs and other food preparation personnel, be skilled in creating plant-rich dishes that customers anticipate will be delicious. These should be gratifying and tasty options, not just healthy but potentially boring and bland alternatives to meat (Raghunathan et al. 2006; Freitas et al. 2015). One factor that may be preventing back-of-house staff from creating these options is that plant-rich dishes can be more complex to prepare than meat-based dishes; they tend to contain more and varied ingredients that each require different and potentially unfamiliar preparation and cooking techniques. Chefs may not have the background to successfully execute these dishes, especially if plant-rich cooking skills are not included in chef training courses, or they may need to update their training in order to make the new and exciting plant-rich recipes that customers are increasingly demanding.

What you can do:

Make sure your back-of-house staff have access to up-to-date training in how to prepare and cook better plant-rich dishes. If you have a training budget, consider inviting an expert to run a dedicated plant-rich training session. You may also consider using a "train-the-trainer" model, where you strengthen one staff member's skills—perhaps by sending him or her on an external training course—and then ask that individual to run sessions with the rest of your staff. If you have a limited training budget, look online for good tutorial videos. Where possible, try to incorporate a practical element into these training sessions. Give staff the opportunity to try out new cooking methods and to taste the food they prepare. This will increase the chances they remember the content taught.

Case study:

Hilton combined its chefs' passion for creating new and exciting dishes with the hospitality chain's commitment to sustainability to develop a series of 10 training videos. These videos aimed to inspire chefs to create innovative burger blends, working in partnership with WRI, the Mushroom Council, and the Culinary Research and Education Academy. The Blended Burger is made of 20–30 percent mushrooms and 70–80 percent meat, a dish that helps to reduce greenhouse gas emissions by up to 29 percent compared to a regular burger (Waite et al. 2018). The videos presented a step-by-step guide on how to create different blends of meats and mushrooms for different flavor and texture profiles. A different one-minute video was posted each day via the dedicated app of the Hilton Americas culinary team and shared with more than 300 hotels during a campaign called "10 Days of Burger." Chefs offered anecdotal feedback that the initiative "created energy in hotels" and that it was a good "creativity opportunity." A year later, more than 400 hotels in the Americas reported that they served reduced-meat options, including the Blended Burger. The video series has now been shared with all 6,000 Hilton hotels globally.

PPL3 ENCOURAGE FRONT-OF-HOUSE STAFF TO TRY PLANT-RICH DISHES THEMSELVES

In more detail:

When staff have tasted and enjoyed plant-rich dishes, they are in a stronger position to recommend these options to diners. Personal recommendations are a powerful way to influence diners' decision-making and are most effective when given by staff members who are seen as a trustworthy and credible sources of information (Toivonen et al. 2016). Service staff who speak positively about their personal experiences with a particular plant-rich dish, or who mention that this dish is their own favorite choice will signal to diners that plant-rich options are a normal and rewarding option (Stok et al. 2016).

What you can do:

If possible, within the context of your dining establishment, consider offering your front-of house staff plant-rich dishes at discounted rates or free as staff meals during working hours. Alternatively, consider organizing periodic food-tasting sessions to let your staff experience these dishes firsthand. Tasting sessions can be combined with broader training on each dish, providing servers with the facts and selling points they need to selectively promote plant-rich dishes to diners.

Case study:

As part of a new seasonal offer on the "Blended Burger"—a 70–80 percent meat and 20–30 percent mushroom-blended burger patty with a lower environmental footprint than a regular burger (Waite et al. 2018)—staff at the Cleveland Hilton hotel were given full training on how to promote this dish to diners. This training included demonstrations from the culinary team and dish tasting for a full week, plus preshift sales training to give service staff a comprehensive understanding of the sustainability and healthy aspects of the burger that they could communicate to diners. This training and food tasting helped engage the whole team in promoting this more sustainable option. In the first week that the Blended Burger was offered, 100 dishes were sold—a successful outcome attributed in part to the enthusiasm of the team. The Cleveland Hilton has since repeated this seasonal special training and tasting approach, with the team once again celebrating Burger Week in 2019 and looking to integrate the Blended Burger as a permanent fixture on its menu.

Further reading

Waite, R., D. Vennard, and G. Pozzi. 2018. "This Flavor-Packed Burger Saves as Many Emissions as Taking 2 Million Cars Off the Road." Blog. World Resources Institute. https://www.wri.org/blog/2018/02/flavor-packed-burger-saves-many-emissions-taking-2-million-cars-road.

PPL4 GIVE CHEFS AND FOOD PREPARATION STAFF ACCESS TO THE RIGHT TOOLS, EQUIPMENT, AND INGREDIENTS TO PREPARE PLANT-RICH DISHES

In more detail:

Just as a lack of training can limit how well back-of-house food preparation staff are able to make plant-rich dishes, the wrong tools, equipment, and ingredients can also prevent staff from successfully preparing dishes that customers want to order, even if they have the will and expertise to do so. By investing in the right equipment for chefs, a food service provider can clearly signal its intent to enable its staff to make positive change happen. Investment in the infrastructure needed to make plant-rich dishes can also motivate staff, who may then wish to get optimal use and value from their new tools or equipment. Also important is that chefs have the right ingredients to make new and interesting plant-rich dishes. In some instances, these ingredients may be a challenge to procure, especially if they are particularly rare, expensive, required in very small amounts, or involve seeking out entirely new suppliers—complexities that need to be overcome with careful planning.

What you can do:

Once you know which plant-rich dishes you want to sell, consider conducting an audit of your existing infrastructure to understand which tools or equipment may be missing. Speak to your staff to understand their views on which changes are needed or consult with those already preparing and offering the types of dishes you wish to sell. In terms of sourcing ingredients, if working in a large organization, you may need to carefully consider ways to make the case that certain plant-based ingredients need to be bought by your procurement teams, possibly by highlighting how their addition can boost sales by responding to consumer trends or by differentiating your brand from competitors.

Case study:

Eden Caterers, a London-based sustainable catering company, took its latest kitchen expansion and refit as an opportunity to invest in equipment that would help its chefs prepare plant-rich dishes in an easier and more time-efficient way. During its kitchen redesign, the company not only invested in more energy-efficient combi ovens and cookware but also bought a large multiuse vegetable preparation machine to help its chefs speed and automate the dicing, slicing, and grating of plant ingredients. The company notes that another benefit of this machine is that it can easily produce around 100 kilograms of perfect mashed potato, making it the ideal kitchen addition to produce the large batches needed to supply the type of events that Eden Caterers serves.

PPL5 REWARD CHEFS AND FOOD PREPARATION STAFF WHO CREATE POPULAR PLANT-RICH DISHES

In more detail:

Encouraging staff to use their creativity to develop new and appealing plant-rich dishes can not only boost diner demand for these options but can also enhance chefs' job satisfaction and pride in their work (Tongchaiprasit and Ariyabuddhiphongs 2016). Rewarding chefs and food preparation staff who create novel plant-rich dishes with praise, recognition, cash, or another prize is also a great way to build staff motivation. Incentives like this can help nurture and develop the talents of staff members while also improving the sustainability of the food on offer (Putra et al. 2015). Setting up dish-creation challenges between staff members or sites can also introduce a sense of friendly competition, which can feed staff members' drive to do a good job.

What you can do:

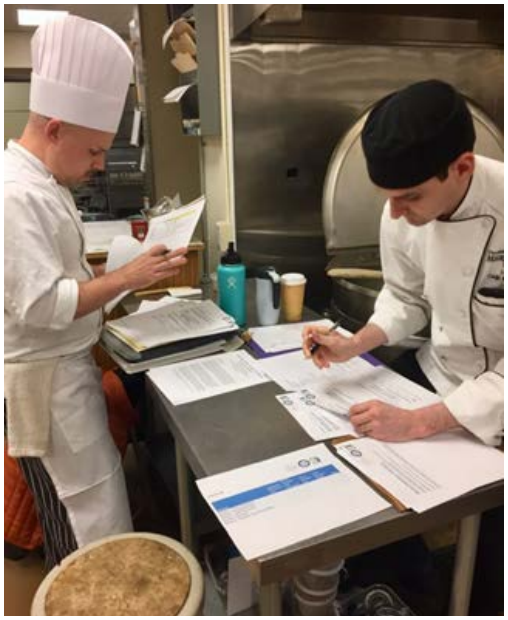
Find ways to recognize and reward staff members who innovate new plant-rich dishes. The reward you choose should be meaningful to the staff member or the team involved, whether its form be financial (a bonus or voucher), material (a gift), or social (praise or public recognition). To foster creativity, ensure that staff have an opportunity to try different approaches, potentially by introducing dedicated creative sessions where staff can come together to share and try out new ideas in a friendly and nonjudgmental environment. You may wish to bring in outside experts to run these sessions, trainers who will be able to introduce new ideas and methods that your staff can then adapt and modify.

If you decide to run plant-rich culinary competitions with your staff, work out in advance which criteria you want to use to measure success (e.g., dish sales or a team vote for the best option) and advertise these competitions within your operations. Once again, always reward your winners and runners-up with prizes that are valuable to them.

Case study:

The global nonprofit organization Health Care Without Harm encouraged chefs working in hospital dining facilities across the United States to submit their best plant-rich recipes to a competition judged by the Seattle Culinary Academy, run in partnership with the Culinary Institute of America's Menus of Change initiative. Shortlisted dishes were judged on key criteria such as flavor (compilation and balance of ingredients), sensory appeal, ease of execution, availability of ingredients, nutrition, and taste, and included a turkey grain bowl, red dahl, a miso noodle and veggie bowl, jackfruit teriyaki, and butternut squash enchiladas. The chef who created the winning dish (red dahl) was recognized during a presentation in front of peers at an industry conference, and the winning dish was extensively publicized via social media, reaching more than 1,200 health-care facilities (see Figure 6). The recipe has since been made available to over 700 health-care dining facilities across the country.

Figure 6 | Chefs Preparing the Culinary Competition's Winning Dish



Source: Culinary Institute of America.

PPL6 PROVIDE FRONT-OF-HOUSE STAFF WITH TALKING POINTS TO PROMOTE PLANT-RICH DISHES TO CUSTOMERS

In more detail:

Front-of-house staff (e.g., service or wait staff, cashiers, hosts) are in a unique position to interact with and influence diners' choices (Ebster et al. 2006). Training front-of-house staff in how to communicate the benefits of plant-rich dishes in interesting and engaging ways can help diners see these as attractive choices. In addition, diners may also wish (albeit unconsciously) to comply with the recommendations of a front-of-house staff member; humans are social animals who are highly motivated to be approved of and accepted by others. This means that diners may select a recommended plant-rich dish in order to be seen as making the "better" choice in the eyes of their server, or in those of their fellow diners, or they may want to follow a recommendation in the hope of being liked by that member of staff (Herman et al. 1983).

What you can do:

Provide front-of-house staff with talking points that they can memorize to better sell the benefits of plant-rich dishes. Good examples of attributes that you may wish to promote include the delicious flavor of plant-rich dishes, the quality or uniqueness of the ingredients, or any interesting preparation techniques involved in making the dish. In all cases, try to selectively sell the benefits of plant-rich options over and above the meat dishes you offer. Consider different ways to engage your diners in conversation before they have made their choices, perhaps when they are given menus or being seated, or train your staff to talk up the benefits of plant-rich dishes when orders are being placed in order to prompt diners to reconsider the plant-rich option if not already selected. This approach may also be used effectively in combination with PRS3.

Case study:

Researchers in the Netherlands wanted to determine whether a verbal recommendation from wait staff would influence sales of a plant-rich side dish and drink additions to a set breakfast menu. Over a 23-week period, researchers measured sales of orange juice and fruit salad in a Dutch self-service restaurant. For the first 10 weeks, staff recommended no additions to the set breakfast on offer; from 11 to 23 weeks staff were required to ask all diners whether they wanted to add an optional orange juice or side of fruit salad to their breakfast at the point of sale. Comparing sales data from before and after the verbal recommendations were introduced, researchers found that the number of extra dishes that were sold increased significantly with the prompt from staff. For example, orange juice sales increased from a baseline of around 20 percent of diners adding this option to their breakfasts before the recommendation to around 42 percent after, while fruit salad sales tripled from a baseline of 3 percent to around 9 percent. Furthermore, data from additional questionnaires conducted with diners suggest that they were largely happy with this approach and did not feel unduly pressured into purchasing these options with their meal (van Kleef et al. 2015). While not specifically focused on shifting away from meat and toward plant-rich dishes, this research clearly indicates the power of staff recommendations to influence the choices of diners.

Further reading

van Kleef, E., O. van den Broek, and H.C.M. van Trijp. 2015. "Exploiting the Spur of the Moment to Enhance Healthy Consumption: Verbal Prompting to Increase Fruit Choices in a Self-Service Restaurant." *Applied Psychology: Health and Well-Being* 7 (2): 149–66. https://doi.org/10.1111/aphw.12042.

SUMMARY

This Playbook of 23 prioritized behavior change interventions provides guidance and inspiration for potential change-makers in the food service industry to encourage diners to choose plant-rich dishes. In this chapter, we outline some of the main strengths and limitations of the methods we used to build the Playbook, and provide recommendations on the next steps needed to advance this important agenda.

Strengths and Limitations of Our Approach to Building the Playbook

Our approach to building this Playbook drew inspiration from academic research literature and from industry experience of what works in real food service establishments. Through this process, we have identified a long list of 57 potentially effective behavior change interventions. This list goes beyond approaches tested in the academic research, incorporating valuable insights from those working in the food service industry.

From this long list, we identified a priority shortlist of 23 interventions deemed by a sample of industry representatives to be the most feasible and impactful ways to encourage diners to shift their food choices. This shortlist should now be prioritized for further research given that these interventions are most acceptable to, and so most likely to be adopted by, change-makers in the food service sector.

There are, however, several limitations to the method that we used to build this Playbook. There is currently too little research on each of the 57 interventions to draw clear conclusions on which ones work best. As a result, we have deferred to industry representative surveys as one way to identify "best bet" approaches. Industry scores on both impact and feasibility criteria are, however, subjective judgments rather than evidence-based ratings, and they do not necessarily reflect true intervention impact and feasibility as determined by robust scientific evaluation. These judgments also do not account for other criteria that operators may wish to consider when selecting interventions, including cost-effectiveness and customer acceptance. Furthermore, we also note the positive linear distribution of data points in Figure 3. This indicates that scores on both impact and feasibility criteria tend to correlate closely. This may imply that perceptions of impact are strongly influenced by perceptions of feasibility (or vice versa), suggesting that scores on both criteria may instead reflect an overall judgment about the intervention rather than accurate views on each criterion separately.

We further note some potential for bias in recruitment of our sample of industry representatives. Survey responses relied on voluntary participation, were not incentivized, and were publicized via WRI's media assets. Together, these factors suggest that members of the recruited sample may be familiar with WRI's food-focused research and objectives and that some may be particularly interested in the issue of sustainable diets. These conditions may have influenced survey responses.

Additionally, we highlight that our sample of industry representatives was dominated by respondents from the United Kingdom (30 percent of the sample) and United States (33 percent of the sample). This means that overall intervention scores are likely to reflect culturally specific dining practices and may not be relevant to food service providers located in other geographies. Moreover, we note that the majority of the research included in our review was also conducted in the United States or Europe. As a result, the intervention list derived from this research is not necessarily applicable to other countries where food service differs considerably on factors such as the type of cuisine on offer, meal structure, ways of eating, style of service, food service environment, or relative price of food.

Conclusions and Next Steps

The 23 interventions described in detail in this Playbook are intended for use by those working in the food service sector. The aim of these interventions is to help encourage diners to shift away from ruminant meat and toward more plant-rich dishes when dining out.

Many of these interventions are yet to be tested in robust research trials to determine their true impact. As such, we recommend not only that these approaches be adopted by food service providers to help accelerate a transition to more sustainable plant-rich diets but also that researchers based in universities or other research institutes conduct further impact evaluations, in collaboration with industry, to determine their effectiveness. In particular, much more research is needed to understand the applicability of the interventions identified in this Playbook to food service establishments that operate in regions other than the United States and Europe. This work would allow gaps in the existing evidence base to be filled, and would enable measurement of a broader range of relevant outcomes (for example, customer satisfaction or potential unintended consequences of interventions, such as increased food waste). Further collaborative research between industry and academia would also allow more in-depth prioritization of interventions to be conducted. This would involve integrating future research that has determined the strength of evidence for a particular intervention with industry representative rankings of impact, cost, and feasibility, thereby usefully combining scientific understanding with practical insights.

We identified a priority shortlist of 23 interventions deemed by a sample of industry representatives to be the most feasible and impactful ways to encourage diners to shift their food choices. This shortlist should now be prioritized for further research.

APPENDIX 1: DETAILS ON THE METHODOLOGY USED TO BUILD THE PLAYBOOK

Scoping Review Search Strategy

To build the Playbook, we first drew inspiration from existing academic research literature on the topic of dietary behavior change. To do this, we conducted scoping searches of several academic databases (PubMed, Environment Complete, Academic Search Complete, Lexus Nexus, and USDA) between November 2018 and February 2019. To ensure that our search was manageable, we limited our database search strategies to only locate publications from the year 2000 onward. The search terms that we used to find publications in these databases reflected our "Eligibility Criteria for the Review," which are listed in Table A1. An example of the search string that we used (from PubMed) is also shown in Box A1.

These criteria were intended to allow us to locate original research conducted in (or relevant to) real-life food service settings that included a measure of change in the selection, purchasing, or consumption of at least one plant-rich food, dish, or product. Eligible settings included food service establishments (e.g., restaurants, cafés, workplace canteens, kiosks) or food shopping establishments (e.g., grocery stores, supermarkets). We decided to extend the search beyond food service alone to allow us to draw insights from a large pool of studies exploring food choice in retail settings, which has some relevance to choice-making in self-service dining facilities. We also included lab-based or online studies where these had tested an intervention that was either already commonly used in "real-life" food service or shopping environments (e.g., food-labeling studies) or could plausibly be applied to these contexts. Eligible studies did not need to be narrowly focused on the topic of plant-rich diets as we also wished to learn from broader research on the topic of dietary behavior change (e.g., for health reasons).

Table A1 | Eligibility Criteria for the Review

ELIGIBILITY CRITERIA	INCLUDE IF...	EXCLUDE IF...
Study setting	The study has been conducted in a real-life setting where food is either chosen, purchased, or eaten, including supermarkets, restaurants, cafés, canteens, or online ordering platforms. Lab-based studies are eligible if the intervention they are exploring could plausibly be used, or is already being used, in the real-life settings.	The study focuses on in-home food preparation and consumption or is a school-based study targeting children.
Type of intervention	The study states that its aim is to influence participants' intentions or behavior in relation to selecting, purchasing, or consuming a plant-rich food (e.g., a food or dish that contains vegetables, legumes, fruits, grains, pulses, nuts, or seeds, with or without eggs, fish, and dairy, but does not contain meat). The study does not specifically need to focus on dietary behavior change for environmental benefits (e.g., health studies are eligible if they focus on plant-rich foods like fruit and vegetables). Also eligible are studies looking at ways to reduce consumption of meat foods or dishes.	The study aims to influence general dietary patterns or consumption of a specific nutrient (e.g., "low fat" or "low salt"), without measuring a specific plant-based food item from which the nutrient is derived.
Outcome measure	The study includes a between or within group comparison of intentions or actual change in selection, purchasing, or consumption of a specific plant-rich food product (e.g., fruit, vegetables) or a dish (e.g., "soup" or "vegetarian lasagna").	The study measures a diet-related physiological or anthropometric measure (e.g., blood pressure, body weight) only.
Study population	Free-living adults, aged > 18 years.	Institutionalized adults (e.g., in-patients, prisoners) who do not have autonomy over dietary choices.
Study design	Original controlled or randomized controlled trials, quasi-experiments or pre-posttest studies that compare a minimum of two groups (i.e., control and intervention).	Reviews or meta-analyses, qualitative studies, or protocol-only papers.
Date	Studies published on or after 2000.	

Only original research that compared two or more groups (e.g., either between-group [e.g., intervention versus control] or within-group [e.g., pre- versus posttest] comparisons) was included in this scoping review. This limitation allowed us to identify original research and screen out review papers. This provided us with access to the fullest description of the interventions tested in each primary study, helping us to unpack the exact techniques and processes involved in each intervention (this level of detail is rarely reported in review papers). For completeness, however, we also conducted forward reference searches of any review that our search terms picked up, tracking down any citations that were within scope. Moreover, we also performed a broad search for other reviews on the topic of dietary behavior change to identify further studies that our searches may have missed.

Scoping Review Search Results

Figure A1 presents a flow diagram summarizing the results of our database search strategy and the process by which we removed ineligible studies based on the aims of the review.

Our database searches located a total of 4,201 potentially eligible publications, to which a further 292 were added from a forward reference search of these reviews (e.g., hand-searching reference lists to identify potentially eligible primary studies). Two researchers then systematically screened the titles and abstracts of these publications against the eligibility criteria, removing obviously ineligible papers and taking the remainder (196 studies) forward to full text review.

Of this shortlist, a further 109 papers were deemed ineligible upon full text review (see the flow diagram for reasons), leaving us with a final total of 89 studies that were taken forward and used as the basis for creating the Playbook.

BOX A1 | PUBMED SEARCH STRING

(canteen OR cafe OR cafeteria OR restaurant OR supermarket OR retail OR takeout OR "take away" OR shop OR store OR "food service" OR "food provider" OR meal)

AND

(RCT OR "randomized controlled trial" OR "controlled trial" OR "quasi experiment*" OR "pre posttest" OR "retrospective controlled group" OR "prospective controlled study" OR "cohort study" OR "case-controlled study" OR "cross sectional study")

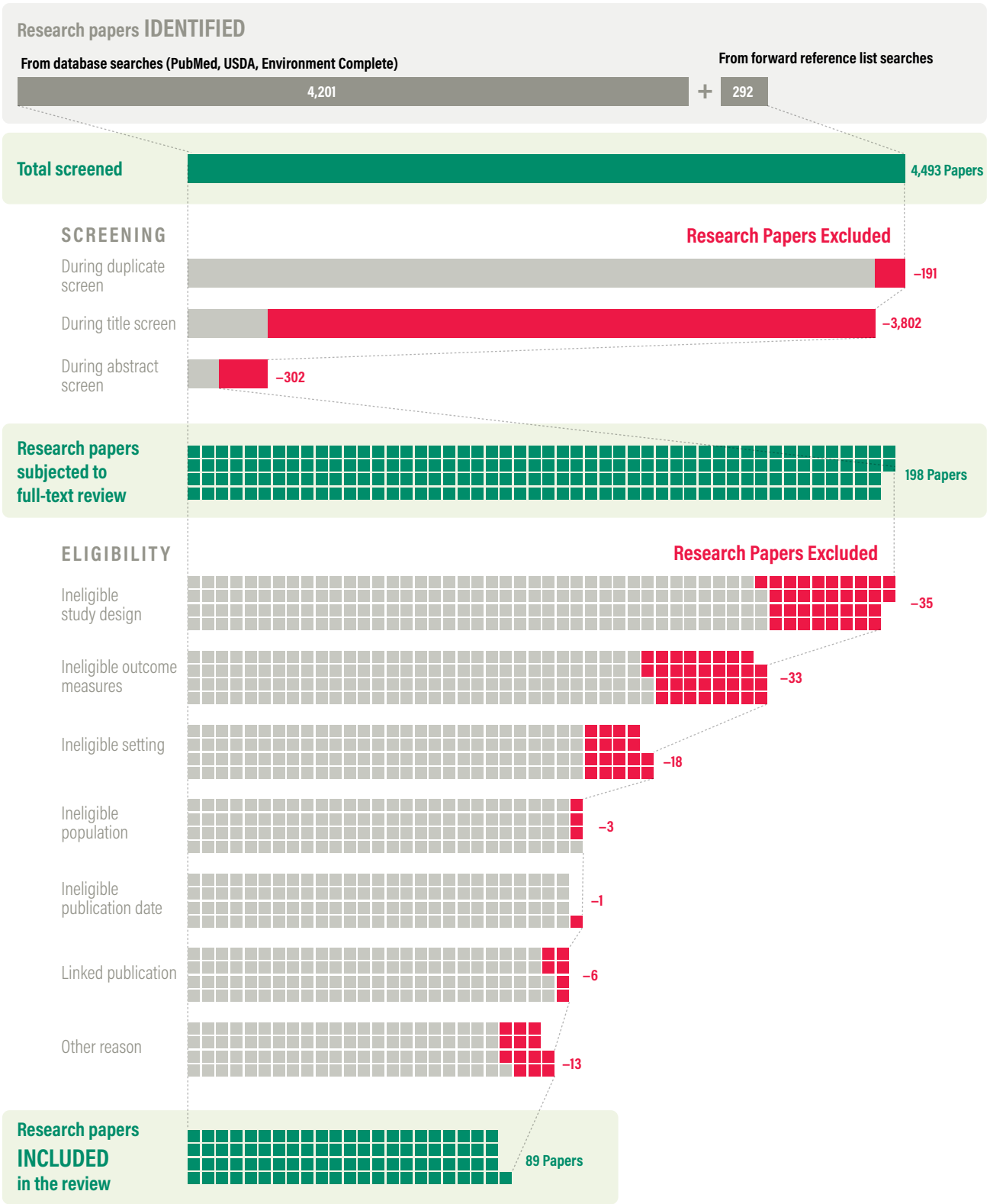
AND

(behavior OR eat* OR consumption OR purchase OR sales OR diet OR food OR consume OR motivation OR intention OR attitude)

AND

(fruit OR vegetable OR "plant based" OR "plant forward" OR meat OR beef OR lamb OR chicken OR dairy OR legumes OR grains OR vegetarian OR vegan OR flexitarian)

Figure A1 | Review Search and Exclusion Flow Diagram



Source: Authors.

Coding and Clustering Interventions

Next we performed a data extraction exercise on the 89 eligible publications. This involved our developing a coding scheme that we used to classify all the different components that made up each intervention at the most granular level of distinction possible (i.e., intervention techniques were coded at a level where no further reduction was possible). This granular approach permitted us to pick apart all the elements that comprised the vast number of multicomponent interventions available in the literature (e.g., where multiple interventions are tested together at the same time), rather than simply clumping these elements together as a single group.

In more detail, this scheme involved classifying each intervention by combining two sets of codes that represented the mode of intervention delivery (e.g., labeled A–J, for example, face-to-face, leaflets or newsletter, packaging, posters and signs, digital media, mass media, physical environment, or the product itself) and the behavior change technique delivered (e.g., labeled 1–97, based on the 93 techniques listed under the "Behavior Change Technique Taxonomy," plus an additional four that we developed to code interventions that involved food product reformulation [Michie et al. 2013]).

In addition, we also extracted data on other key elements of each study using a separate data extraction form. This form included information on study aims, design features, participants, setting, outcome measures, and if the study identified the intervention as effective at shifting participants' diets. Data extraction was conducted by one researcher, with 20 percent of data extractions cross-checked by a second researcher.

Once we had coded all our eligible studies, we then organized our codes into five different groups we believe represent the main targets for intervention in food service settings. We called this the 5P framework, representing Product, Placement, Presentation, Promotion, and People.

Industry Consultation and Playbook Iteration

Once we had finalized the first version of the Playbook, we showed this to a group of food industry and sustainability representatives ($N = 18$ individuals), including representatives from the Better Buying Lab's member and partner organizations (see Box A2). These individuals were asked to review the Playbook's contents and provide written feedback on the overall structure and presentation, as well as give details of any additional interventions that they thought were missing from the current edit, based on their own experience working in food service. This written feedback was followed up with a telephone call, to clarify any points of confusion and understand priorities for editing the Playbook to produce a more audience-appropriate edit.

The changes that we made to version 1 of the Playbook based on this feedback involved amalgamating and refining the interventions listed under four of the 5Ps. Other general recommendations included a suggestion to clarify the audience for the Playbook to ensure that the final product is targeted appropriately, and to include case studies, images, and easily readable instructions in the final version to make each intervention clear and easy to implement.

BOX A2 | THE BETTER BUYING LAB

The Better Buying Lab is an initiative of the World Resources Institute, a global research organization that turns big ideas into action to sustain our natural resources—the foundation of economic opportunity and human well-being.

Launched in August 2016, the Lab brings together the brightest and best minds from consumer research, behavioral economics, and marketing strategy—along with companies in the food industry—to research, test, and scale new strategies and plans that help consumers select sustainable foods.

Following these suggested edits, we developed the final structure of the Playbook, containing 57 interventions underneath our five overarching "P" categories.

Industry Ranking

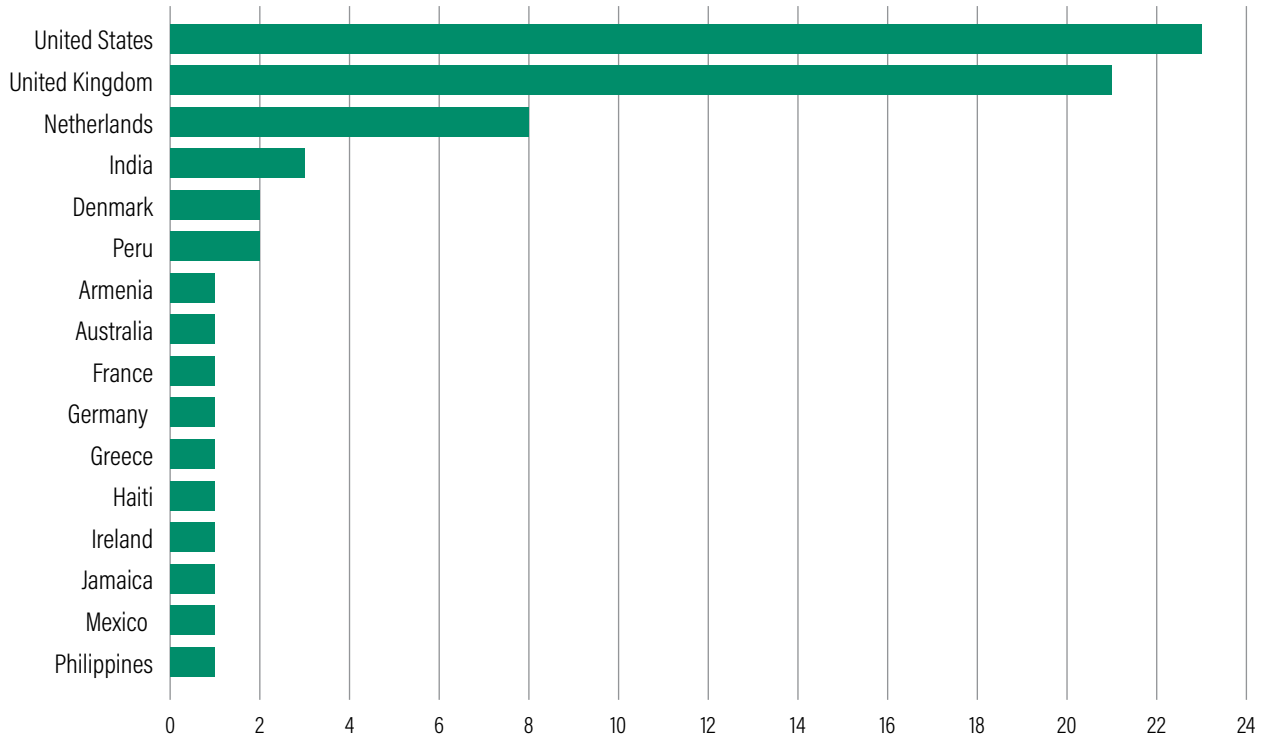
Next we developed an online survey (via the platform Survey Gizmo) and publicized this to a larger sample of industry representatives with the intention that these individuals would help score the 57 interventions in the Playbook. Based on final scores, our goal was to produce a prioritized list of "best bet" interventions based on those that ranked above the average (median) score. Participation in this survey was advertised via WRI's social media assets and through the networks of the WRI Food Program's industry partners.

For each intervention, participants were asked to reflect on what the approach involved and to rate it according to two key criteria: (1) whether they thought the approach would be effective at shifting the preferences of their own customers away from meat and toward plant-rich options (the "impact criteria": *"How well do you think this intervention would work to shift customers' choices away from meat and toward plant-rich dishes?" Intervention X description*) and (2) whether they thought the approach would be feasible to use in their own operations (the "feasibility criteria": "*How feasible do you think this intervention would be to do in practice?" Intervention X description*). Each question was answered according to a seven-point sliding scale. Participants were each randomized to see a subset of 15 interventions from the full list of 57 to prevent response fatigue and dropout.

In total, we received valid responses from 69 industry representatives. This sample included representatives based in 16 different countries (see Figure A2) across 44 different organizations in 9 different sectors (see Figure A3). Some of the 44 organizations were large multinationals spanning more than one sector. Each intervention was ranked approximately 20 times.

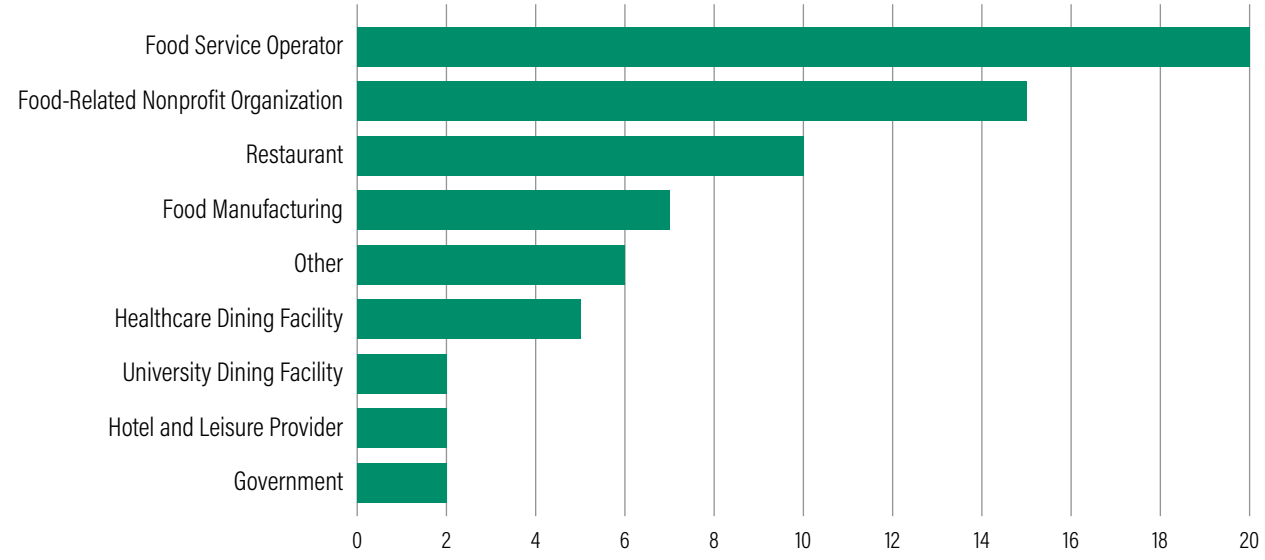
Following data collection, intervention scores were summed and ranked and the median values were calculated for both the impact and feasibility criteria across the full sample. We then shortlisted all interventions that fell above the median score threshold on both criteria, which left us with 23 industry rated "best bet" interventions that form the content of this Playbook.

Figure A2 | Number of Industry Representatives by Country



Source: Authors.

Figure A3 | Number of Industry Representatives by Organization Type



Source: Authors.

REFERENCES

An, R. 2016. "Weekend-Weekday Differences in Diet among U.S. Adults, 2003–2012." *Annals of Epidemiology* 26 (1): 57–65. https://doi.org/https://doi.org/10.1016/j.annepidem.2015.10.010.

Bacon, L., and D. Krpan. 2018. "(Not) Eating for the Environment: The Impact of Restaurant Menu Design on Vegetarian Food Choice." *Appetite* 125: 190–200. https://doi.org/10.1016/J.APPET.2018.02.006.

Bacon, L., J. Wise, S. Attwood, and D. Vennard. 2018. "The Language of Sustainable Diets: A Field Study Exploring the Impact of Renaming Vegetarian Dishes on U.K. Café Menus." Technical note. World Resources Institute. https://www.wri.org/publication/language-sustainable-diets.

Bianchi, F., E. Garnett, C. Dorsel, P. Aveyard, and S.A. Jebb. 2018a. "Restructuring Physical Micro-environments to Reduce the Demand for Meat: A Systematic Review and Qualitative Comparative Analysis." *Lancet Planetary Health* 2 (9): e384–97. https://doi.org/10.1016/S2542-5196(18)30188-8.

Bianchi, F., C. Dorsel, E. Garnett, P. Aveyard, and S.A. Jebb. 2018b. "Interventions Targeting Conscious Determinants of Human Behaviour to Reduce the Demand for Meat: A Systematic Review with Qualitative Comparative Analysis." *International Journal of Behavioral Nutrition and Physical Activity* 15: 102. https://doi.org/10.1186/s12966-018-0729-6.

Broers, V.J.V., S. van den Broucke, C. Taverne, and O. Luminet. 2019. "Default-Name and Tasting Nudges Increase Salsify Soup Choice without Increasing Overall Soup Choice." *Appetite* 138: 204–14. https://doi.org/https://doi.org/10.1016/j.appet.2019.03.027.

Brunner, F., V. Kurz, D. Bryngelsson, and F. Hedenus. 2018. "Carbon Label at a University Restaurant: Label Implementation and Evaluation." *Ecological Economics* 146 (August 2017): 658–67. https://doi.org/10.1016/j.ecolecon.2017.12.012.

Bucher, T., K. van der Horst, and M. Siegrist. 2011. "Improvement of Meal Composition by Vegetable Variety." *Public Health Nutrition* 14 (8): 1357–63. https://doi.org/DOI: 10.1017/S136898001100067X.

Campbell-Arvai, V., J. Arvai, and L. Kalof. 2012. "Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision." *Environment and Behavior* 46 (4): 453–75. https://doi.org/10.1177/0013916512469099.

Carroll, K.A., A. Samek, and L. Zepeda. 2018. "Food Bundling as a Health Nudge: Investigating Consumer Fruit and Vegetable Selection Using Behavioral Economics." *Appetite* 121: 237–48. https://doi.org/https://doi.org/10.1016/j.appet.2017.11.082.

Chapman, D.A., A. Corner, R. Webster, and E.M. Markowitz. 2016. "Climate Visuals: A Mixed Methods Investigation of Public Perceptions of Climate Images in Three Countries." *Global Environmental Change* 41: 172–82. https://doi.org/https://doi.org/10.1016/j.gloenvcha.2016.10.003.

Chebat, J.-C., and R. Michon. 2003. "Impact of Ambient Odors on Mall Shoppers' Emotions, Cognition, and Spending: A Test of Competitive Causal Theories." *Journal of Business Research* 56 (7): 529–39. https://doi.org/https://doi.org/10.1016/S0148-2963(01)00247-8.

Clement, J., J. Aastrup, and S.C. Forsberg. 2015. "Decisive Visual Saliency and Consumers' In-Store Decisions." *Journal of Retailing and Consumer Services* 22: 187–94. https://doi.org/https://doi.org/10.1016/j.jretconser.2014.09.002.

Climatewatch. 2014. "India: Greenhouse Gas Emissions and Emissions Targets." https://www.climatewatchdata.org/countries/IND.

CNBC. 2019. "Impossible Whopper Boosted Burger King Traffic by 18%, Report Says." May 28. https://www.cnbc.com/2019/05/28/impossible-whopper-boosted-burger-king-traffic-by-18percent-report-says.html?mc_cid=37f1cbda8f&mc_eid=f3d0a91d99.

CNN Business. 2019. "McDonald's Joins the Meatless Burger Trend in One of Its Biggest Markets." May 8. https://edition.cnn.com/2019/05/07/business/mcdonalds-meatless-burger-germany/index.html.

Cohen, D.A., and S.H. Babey. 2012. "Contextual Influences on Eating Behaviours: Heuristic Processing and Dietary Choices." *Obesity Reviews* 13 (9): 766–79. https://doi.org/10.1111/j.1467-789X.2012.01001.x.

Crum, A., W. Corbin, K.D. Brownell, and P. Salovey. 2011. "Mind over Milkshakes: Mindsets, Not Just Nutrients, Determine Ghrelin Response." *Health Psychology* 3. https://doi.org/10.1037/a0023467.

Dar-Nimrod, I., C.D. Rawn, D.R. Lehman, and B. Schwartz. 2009. "The Maximization Paradox: The Costs of Seeking Alternatives." *Personality and Individual Differences* 46 (5): 631–35. https://doi.org/https://doi.org/10.1016/j.paid.2009.01.007.

de Vaan, J. 2018. "Eating Less Meat: How to Stimulate the Choice for a Vegetarian Option without Inducing Reactance?" Master's thesis. Faculteit der Sociale Wetenschappen, Radboud University.

dos Santos, Q., F.J.A. Perez-Cueto, V.M. Rodrigues, K. Appleton, A. Giboreau, L. Saulais, E. Monteleone, et al. 2019. "Impact of a Nudging Intervention and Factors Associated with Vegetable Dish Choice among European Adolescents." *European Journal of Nutrition*, February. https://doi.org/10.1007/s00394-019-01903-y.

Ebster, C., U. Wagner, and S. Valis. 2006. "The Effectiveness of Verbal Prompts on Sales." *Journal of Retailing and Consumer Services* 13 (3): 169–76. https://doi.org/https://doi.org/10.1016/j.jretconser.2005.08.003.

Elzerman, J., M. Boekel, and P. Luning. 2013. "Exploring Meat Substitutes: Consumer Experiences and Contextual Factors." *British Food Journal* 115. https://doi.org/10.1108/00070701311331490.

Foroni, F., G. Pergola, and R.I. Rumiati. 2016. "Food Color Is in the Eye of the Beholder: The Role of Human Trichromatic Vision in Food Evaluation." *Scientific Reports* 6: 37034. https://doi.org/10.1038/srep37034.

Forwood, S.E., A.D. Walker, G.J. Hollands, and T.M. Marteau. 2013. "Choosing between an Apple and a Chocolate Bar: The Impact of Health and Taste Labels." *PLoS ONE* 8 (10): e77500. https://doi.org/10.1371/journal.pone.0077500.

Freitas, E.d.S.d., R. Canuto, R.L. Henn, B. Anselmo Olinto, J.B.A., Macagnan, M.P. Pattussi, F.M. Busnello, and M.T.A. Olinto. 2015. "Alteração no comportamento alimentar de trabalhadores de turnos de um frigorífico do sul do Brasil." *Ciência & Saúde Coletiva*. https://doi.org/10.1590/1413-81232015208.18642014.

Friis, R., L.R. Skov, A. Olsen, K.M. Appleton, L. Saulais, C. Dinnella, H. Hartwell, et al. 2017. "Comparison of Three Nudge Interventions (Priming, Default Option, and Perceived Variety) to Promote Vegetable Consumption in a Self-Service Buffet Setting." *PLoS ONE* 12 (5): 1–16. https://doi.org/10.1371/journal.pone.0176028.

Garnett, E., A. Balmford, C. Sandbrook, M.A. Pilling, and T.M. Marteau. 2019. "Impact of Increasing Vegetarian Availability on Meal Selection and Sales in Cafeterias." *Proceedings of the National Academy of Sciences* 116 (42): 20923–29.

Geier, A.B., P. Rozin, and G. Doros. 2006. "Unit Bias: A New Heuristic That Helps Explain the Effect of Portion Size on Food Intake." *Psychological Science* 17 (6): 521–25. https://doi.org/10.1111/j.1467-9280.2006.01738.x.

Gerber, P.J., H. Steinfeld, B. Henderson, A. Mottet, C. Opio, J. Dijkman, A. Falcucci, and G. Tempio. 2013. *Tackling Climate Change through Livestock: A Global Assessment of Emissions and Mitigation Opportunities*. Rome: FAO (Food and Agriculture Organization of the United Nations).

Gidlöf, K., A. Anikin, M. Lingonblad, and A. Wallin. 2017. "Looking Is Buying: How Visual Attention and Choice Are Affected by Consumer Preferences and Properties of the Supermarket Shelf." *Appetite* 116: 29–38. https://doi.org/https://doi.org/10.1016/j.appet.2017.04.020.

Good Food Institute. 2019a. "How to Win at Plant-Based: Toolkit." http://goodfoodscorecard.org/creating-entrees.

Good Food Institute. 2019b. "Plant-Based Entrées." http://Goodfoodscorecard.Org/Entrees/.

Greendish. 2018. "Van Der Valk: SME in à la Carte Restaurants." https://greendish.org/en/van-der-valk-case-study/.

Green Monday. 2019. Restaurant Program. https://greenmonday.org/restaurants/.

Guinard, J.X., A.M. Miller, K. Mills, T. Wong, S. Min Lee, C. Sirimuangmoon, S.E. Schaefer, and G. Drescher. 2016. "Consumer Acceptance of Dishes in Which Beef Has Been Partially Substituted with Mushrooms and Sodium Has Been Reduced." *Appetite* 105: 449–59.

Gustafson, C.R., R. Kent, M.R. Prate Jr. 2018. "Retail-Based Healthy Food Point-of-Decision Prompts (PDPs) Increase Healthy Food Choices in a Rural, Low-Income, Minority Community." *PLoS ONE* 13 (12): e0207792. https://doi.org/10.1371/journal.pone.0207792.

Haines, P.S., M.Y. Hama, D.K. Guilkey, and B.M. Popkin. 2003. "Weekend Eating in the United States Is Linked with Greater Energy, Fat, and Alcohol Intake." *Obesity Research* 11 (8): 945–49. https://doi.org/10.1038/oby.2003.130.

Harris, J., and E.A. Blair. 2006. "Consumer Preference for Product Bundles: The Role of Reduced Search Costs." *Journal of the Academy of Marketing Science* 34 (4): 506–13. https://doi.org/10.1177/0092070306288405.

Haws, K.L., and J.L. Peggy. 2016. "Combining Food Type(s) and Food Quantity Choice in a New Food Choice Paradigm Based on Vice-Virtue Bundles." *Appetite* 103: 441–49. https://doi.org/https://doi.org/10.1016/j.appet.2015.11.012.

Herman, C.P., M.P. Olmsted, and J. Polivy. 1983. "Obesity, Externality, and Susceptibility to Social Influence: An Integrated Analysis." *Journal of Personality and Social Psychology* 45 (4): 926–34. https://doi.org/10.1037/0022-3514.45.4.926.

Hoek, A.C., P.A. Luning, P. Weijzen, W. Engels, F.J. Kok, and C. de Graaf. 2011. "Replacement of Meat by Meat Substitutes: A Survey on Person- and Product-Related Factors in Consumer Acceptance." *Appetite* 56 (3): 662–73. https://doi.org/https://doi.org/10.1016/j.appet.2011.02.001.

Hollands, G.J., T.M. Marteau, and P.C. Fletcher. 2016. "Non-conscious Processes in Changing Health-Related Behaviour: A Conceptual Analysis and Framework." *Health Psychology Review* 10 (4): 381–94. https://doi.org/10.1080/17437199.2015.1138093.

Horgan, G.W., A. Scalco, T. Craig, S. Whybrow, and J.I. Macdiarmid. 2019. "Social, Temporal and Situational Influences on Meat Consumption in the UK Population." *Appetite* 138: 1–9. https://doi.org/https://doi.org/10.1016/j.appet.2019.03.007.

Iyengar, S.S., and M.R. Lepper. 2000. "When Choice Is Demotivating: Can One Desire Too Much of a Good Thing?" *Journal of Personality and Social Psychology* 79 (6): 995–1006. https://doi.org/10.1037/0022-3514.79.6.995.

Keesman, M., H. Aarts, S. Vermeent, M. Häfner, and E.K. Papies. 2016. "Consumption Simulations Induce Salivation to Food Cues." *PLoS ONE* 11 (11): e0165449. https://doi.org/10.1371/journal.pone.0165449.

Krishna, A. 2012. "An Integrative Review of Sensory Marketing: Engaging the Senses to Affect Perception, Judgment and Behavior." *Journal of Consumer Psychology* 22 (3): 332–51. https://doi.org/10.1016/j.jcps.2011.08.003.

Labbé, D., L.R. Fries, A. Ferrage, F. Lenfant, N. Godinot, and N. Martin. 2018. "Right Sizing: Sensory-Based Product Design Is a Promising Strategy to Nudge Consumers toward Healthier Portions." *Nutrients* 10 (10): 1544. https://doi.org/10.3390/nu10101544.

Lacroix, K., and R. Gifford. 2019. "Reducing Meat Consumption: Identifying Group-Specific Inhibitors Using Latent Profile Analysis." *Appetite* 138: 233–41. https://doi.org/https://doi.org/10.1016/j.appet.2019.04.002.

Lakkakula, A., J. Geaghan, M. Zanovec, S. Pierce, and G. Tuuri. 2010. "Repeated Taste Exposure Increases Liking for Vegetables by Low-Income Elementary School Children." *Appetite* 55 (2): 226–31. https://doi.org/https://doi.org/10.1016/j.appet.2010.06.003.

Lammers, H.B. 1991. "The Effect of Free Samples on Immediate Consumer Purchase." *Journal of Consumer Marketing* 8 (2): 31–37. https://doi.org/10.1108/07363769110034992.

Lockyer, T. 2006. "Would a Restaurant Menu Item by Any Other Name Taste as Sweet?" *Hospitality Review* 24 (1). https://pdfs.semanticscholar.org/c10e/491d1312e60705fcef0562403f870e1852d8.pdf?_ga=2.108881282.1268519285.1572289877-852858725.1572289877.

Lombardini, C., and L. Lankosi. 2013. "Forced Choice Restriction in Promoting Sustainable Food Consumption: Intended and Unintended Effects of the Mandatory Vegetarian Day in Helsinki Schools." *Journal of Consumer Policy* 26: 159–78.

Marteau, T.M. 2017. "Towards Environmentally Sustainable Human Behaviour: Targeting Non-conscious and Conscious Processes for Effective and Acceptable Policies." *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 375 (2095). http://rsta.royalsocietypublishing.org/content/375/2095/20160371.abstract.

Marteau, T.M., G.J. Hollands, I. Shemilt, and S.A. Jebb. 2015. "Downsizing: Policy Options to Reduce Portion Sizes to Help Tackle Obesity." *BMJ* 351: h5863. https://doi.org/10.1136/bmj.h5863.

Meat Free Monday. 2019. "One Day a Week Can Make a World of Difference." https://www.meatfreemondays.com/.

Michie, S., C.E. Wood, M. Johnston, C. Abraham, M. Richardson, J. Francis, W. Hardeman, et al. 2013. "The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions." *Annals of Behavioral Medicine* 46 (1): 81–95. https://doi.org/10.1007/s12160-013-9486-6.

Milosavljevic, M., V. Navalpakkam, C. Koch, and A. Rangel. 2012. "Relative Visual Saliency Differences Induce Sizable Bias in Consumer Choice." *Journal of Consumer Psychology* 22 (1): 67–74. https://doi.org/https://doi.org/10.1016/j.jcps.2011.10.002.

Mullee, A., L. Vermeire, B. Vanaelst, P. Mullie, P. Deriemaeker, T. Leenaert, S. de Henauw, et al. 2017. "Vegetarianism and Meat Consumption: A Comparison of Attitudes and Beliefs between Vegetarian, Semi-vegetarian, and Omnivorous Subjects in Belgium." *Appetite* 114: 299–305. https://doi.org/10.1016/j.appet.2017.03.052.

Nordgren, L.F., J. van der Pligt, and F. van Harreveld. 2006. "Visceral Drives in Retrospect: Explanations about the Inaccessible Past." *Psychological Science* 17 (7): 635–40. https://doi.org/10.1111/j.1467-9280.2006.01756.x.

Ozdemir, B., and O. Caliskan. 2015. "Menu Design: A Review of Literature." *Journal of Foodservice Business Research* 18 (3): 189–206. https://doi.org/10.1080/15378020.2015.1051428.

Papies, E.K. 2013. "Tempting Food Words Activate Eating Simulations." *Frontiers in Psychology* 4: 838.

Parizel, O., H. Labouré, A. Marsset-Baglieri, G. Fromentin, and C. Sulmont-Rossé. 2017. "Providing Choice and/or Variety during a Meal: Impact on Vegetable Liking and Intake." *Appetite* 108: 391–98. https://doi.org/https://doi.org/10.1016/j.appet.2016.10.027.

Policastro, P., Z. Smith, and G. Chapman. 2015. "Put the Healthy Item First: Order of Ingredient Listing Influences Consumer Selection." *Journal of Health Psychology* 22 (7): 1–11.

Pope, L., E. Roche, C.B. Morgan, and J. Kolodinsky. 2018. "Sampling Tomorrow's Lunch Today: Examining the Effect of Sampling a Vegetable-Focused Entrée on School Lunch Participation, a Pilot Study." *Preventive Medicine Reports* 12: 152–57. https://doi.org/10.1016/j.pmedr.2018.09.010.

Putra, E.D., S. Cho, and J. Liu. 2015. "Extrinsic and Intrinsic Motivation on Work Engagement in the Hospitality Industry: Test of Motivation Crowding Theory." *Tourism and Hospitality Research* 17 (2): 228–41. https://doi.org/10.1177/1467358415613393.

Radnitz, C., K.L. Loeb, K.L. Keller, K. Boutelle, M.B. Schwartz, L.B. Todd, and S. Marcus. 2018. "Effect of Default Menus on Food Selection and Consumption in a College Dining Hall Simulation Study." *Public Health Nutrition* 21 (7): 1359–69. https://doi.org/DOI: 10.1017/S1368980017004220.

Raghunathan, R., R. Walker Naylor, and W.D. Hoyer. 2006. "The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products." *Journal of Marketing* 70 (4): 170–84. https://doi.org/10.1509/jmkg.70.4.170.

Ranganathan, J., D. Vennard, R. Waite, P. Dumas, B. Lipinski, T. Searchinger, and GlobAgri-WRR Model Authors. 2016. "Shifting Diets for a Sustainable Food Future." Working paper. Installment 11 of *Creating a Sustainable Food Future*. World Resources Institute. https://www.wri.org/publication/shifting-diets.

Reed, J.A., A. Powers, M. Greenwood, W. Smith, and R. Underwood. 2011. "Using 'Point of Decision' Messages to Intervene on College Students' Eating Behaviors." *American Journal of Health Promotion* 25 (5): 298–300. https://doi.org/10.4278/ajhp.090511-ARB-162.

Rees, J.H., S. Bamberg, A. Jäger, L. Victor, M. Bergmeyer, and M. Friese. 2018. "Breaking the Habit: On the Highly Habitualized Nature of Meat Consumption and Implementation Intentions as One Effective Way of Reducing It." *Basic and Applied Social Psychology* 40 (3): 136–47. https://doi.org/10.1080/01973533.2018.1449111.

Reichenberger, J., A. Richard, J.M. Smyth, D. Fischer, O. Pollatos, and J. Blechert. 2018. "It's Craving Time: Time of Day Effects on Momentary Hunger and Food Craving in Daily Life." *Nutrition* 55–56: 15–20. https://doi.org/https://doi.org/10.1016/j.nut.2018.03.048.

Reinders, M.J., M. Huitink, S.C. Dijkstra, A.J. Maaskant, and J. Heijnen. 2017. "Menu-Engineering in Restaurants—Adapting Portion Sizes on Plates to Enhance Vegetable Consumption: A Real-Life Experiment." *International Journal of Behavioral Nutrition and Physical Activity* 14 (1): 41. https://doi.org/10.1186/s12966-017-0496-9.

Rioux, C., J. Lafraire, and D. Picard. 2018. "Visual Exposure and Categorization Performance Positively Influence 3- to 6-Year-Old Children's Willingness to Taste Unfamiliar Vegetables." *Appetite* 120: 32–42. https://doi.org/https://doi.org/10.1016/j.appet.2017.08.016.

Rozin, P., S. Scott, and M. Dingley. 2011. "Nudge to Obesity: Minor Changes in Accessibility Decrease Food Intake." *Judgement and Decision Making* 6 (4): 323–32.

Rubens, K. 2017. "A Nudge in the Green Direction." *Behavioral Economics*, January 23. https://www.behavioraleconomics.com/a-nudge-in-the-green-direction/.

Saksena, M.J., A.M. Okrent, T.D. Anekwe, C. Cho, C. Dicken, A. Effland, H. Elitzak, et al. 2018. *America's Eating Habits: Food Away from Home*. *Economic Information Bulletin*, no. 196. www.ers.usda.gov.

Scheibehenne, B., R. Greifeneder, and P.M. Todd. 2010. "Can There Ever Be Too Many Options? A Meta-analytic Review of Choice Overload." *Journal of Consumer Research* 37 (3): 409–25. https://doi.org/10.1086/651235.

Schösler, H., and J. de Boer. 2018. "Towards More Sustainable Diets: Insights from the Food Philosophies of 'Gourmets' and Their Relevance for Policy Strategies." *Appetite* 127: 59–68. https://doi.org/https://doi.org/10.1016/j.appet.2018.04.022.

Schösler, H., J. de Boer, and J.J. Boersema. 2012. "Can We Cut Out the Meat of the Dish? Constructing Consumer-Oriented Pathways towards Meat Substitution." *Appetite* 58 (1): 39–47. https://doi.org/https://doi.org/10.1016/j.appet.2011.09.009.

Searchinger, T., R. Waite, C. Hanson, J. Ranganathan, P. Dumas, and E. Matthews. 2019. *World Resources Report: Creating a Sustainable Food Future—A Menu of Solutions to Feed Nearly 10 Billion People by 2050*. Final report. Washington, DC: World Resources Institute. www.sustainablefoodfuture.org.

Sengupta, S. 2019. "These Five Cuisines Are Easier on the Planet." *New York Times*, April 30. https://www.nytimes.com/2019/04/30/climate/these-five-cuisines-are-easier-on-the-planet.html.

Shah, A.K., and D.M. Oppenheimer. 2008. "Heuristics Made Easy: An Effort-Reduction Framework." *Psychological Bulletin* 134 (2): 207–22. https://doi.org/10.1037/0033-2909.134.2.207.

Sharp, D.E., J. Sobal, and B. Wansink. 2014. "Using Plate Mapping to Examine Portion Size and Plate Composition for Large and Small Divided Plates." *Eating Behaviors* 15 (4): 658–63. https://doi.org/https://doi.org/10.1016/j.eatbeh.2014.08.022.

Smith, S.M., and I. Krajbich. 2018. "Attention and Choice across Domains." *Journal of Experimental Psychology* 147 (12): 1810–26. https://doi.org/10.1037/xge0000482.

Spence, C. 2015. "On the Psychological Impact of Food Colour." *Flavour* 4 (1): 21. https://doi.org/10.1186/s13411-015-0031-3.

Stok, F.M., E. de Vet, D.T.D. de Ridder, and J.B.F. de Wit. 2016. "The Potential of Peer Social Norms to Shape Food Intake in Adolescents and Young Adults: A Systematic Review of Effects and Moderators." *Health Psychology Review* 10 (3): 326–40. https://doi.org/10.1080/17437199.2016.1155161.

Sussman, R., R. Gifford, and W. Abrahamse. 2016. "Social Mobilization: How to Encourage Action on Climate Change." Pacific Institute for Climate Solutions. https://pics.uvic.ca/sites/default/files/uploads/publications/FINAL Social mobilization-Sussman Gifford.pdf.

Toivonen, H., J. Munnukka, and O. Uusitalo. 2016. "Credibility of a Peer Endorser and Advertising Effectiveness." *Journal of Consumer Marketing* 33 (3): 182–92. https://doi.org/10.1108/JCM-11-2014-1221.

Tongchaiprasit, P., and V. Ariyabuddhiphongs. 2016. "Creativity and Turnover Intention among Hotel Chefs: The Mediating Effects of Job Satisfaction and Job Stress." *International Journal of Hospitality Management* 55: 33–40. https://doi.org/https://doi.org/10.1016/j.ijhm.2016.02.009.

Tucker, C.A. 2014. "The Significance of Sensory Appeal for Reduced Meat Consumption." *Appetite* 81: 168–79. https://doi.org/https://doi.org/10.1016/j.appet.2014.06.022.

Turnwald, B.P., and A.J. Crum. 2019. "Smart Food Policy for Healthy Food Labeling: Leading with Taste, Not Healthiness, to Shift Consumption and Enjoyment of Healthy Foods." *Preventive Medicine* 119: 7–13. https://doi.org/https://doi.org/10.1016/j.ypmed.2018.11.021.

Turnwald, B.P., D.Z. Boles, and A.J. Crum. 2017a. "Association between Indulgent Descriptions and Vegetable Consumption: Twisted Carrots and Dynamite Beets." *JAMA Internal Medicine* 177 (8): 1216–18. doi:10.1001/jamainternmed.2017.1637.

Turnwald, B.P., D. Jurafsky, A. Conner, and A.J. Crum. 2017b. "Reading between the Menu Lines: Are Restaurants' Descriptions of 'Healthy' Foods Unappealing?" *Health Psychology*. Advance online publication. http://dx.doi.org/10.1037/hea0000501.

van Kleef, E., O. van den Broek, and H.C.M. van Trijp. 2015. "Exploiting the Spur of the Moment to Enhance Healthy Consumption: Verbal Prompting to Increase Fruit Choices in a Self-Service Restaurant." *Applied Psychology: Health and Well-Being* 7 (2): 149–66. https://doi.org/10.1111/aphw.12042.

Vemula, S.R., S.M. Gavaravarapu, V.V.R. Mendu, P. Mathur, and L. Avula. 2014. "Use of Food Label Information by Urban Consumers in India: A Study among Supermarket Shoppers." *Public Health Nutrition* 17 (9): 2104–14. https://doi.org/DOI:10.1017/S1368980013002231.

Vennard, D. 2019. "Q&A: How a Cuban Name Change Boosted Panera's Soup Sales." World Resources Institute. https://www.wri.org/blog/2019/02/qa-how-cuban-name-change-boosted-paneras-soup-sales.

Vennard, D., T. Park, and S. Attwood. 2018. "Encouraging Sustainable Food Consumption by Using More-Appetizing Language." Technical note. World Resources Institute. https://www.wri.org/publication/encouraging-sustainable-food-consumption-using-more-appetizing-language.

Waite, R., D. Vennard, and G. Pozzi. 2018. "This Flavor-Packed Burger Saves as Many Emissions as Taking 2 Million Cars Off the Road." Blog. World Resources Institute. https://www.wri.org/blog/2018/02/flavor-packed-burger-saves-many-emissions-taking-2-million-cars-road.

Wansink, B., K. van Ittersum, and J.E. Painter. 2005. "How Descriptive Food Names Bias Sensory Perceptions in Restaurants." *Food Quality and Preference* 16 (5): 393–400. https://doi.org/https://doi.org/10.1016/j.foodqual.2004.06.005.

Wardle, J., M.L. Herrera, L. Cooke, and E.L. Gibson. 2003. "Modifying Children's Food Preferences: The Effects of Exposure and Reward on Acceptance of an Unfamiliar Vegetable." *European Journal of Clinical Nutrition* 57 (2): 341–48. https://doi.org/10.1038/sj.ejcn.1601541.

Willett, W., J. Rockström, B. Loken, M. Springmann, T. Lang, S., Vermeulen, T. Garnett, et al. 2019. "Food in the Anthropocene: The EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems." *Lancet* 393 (10170): 447–92. https://doi.org/10.1016/S0140-6736(18)31788-4.

Wise, J., and D. Vennard. 2019. "It's All in a Name: How to Boost the Sales of Plant-Based Menu Items." World Resources Institute. https://www.wri.org/news/its-all-name-how-boost-sales-plant-based-menu-items.

Yeoh, P., and A. North. 2010. "The Effect of Musical Fit on Choice between Two Competing Foods." *Musicæ Scientiæ* 9 (1): 165–80.

Zhou, X., F. Perez-Cueto, Q. dos Santos, W. Bredie, M. Molla-Bauza, M. Brugarolas, V.M. Rodrigues, et al. 2019. "Promotion of Novel Plant-Based Dishes among Older Consumers Using the 'Dish of the Day' as a Nudging Strategy in 4 EU Countries." *Food Quality and Preference* 75: 260–72.

ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.

Our Challenge
Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision
We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach
COUNT IT
We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT
We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT
We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.

PHOTO CREDITS

Cover, pg. i and ii, Brooke Lark/Unsplash; pg. iv, Zarzamora; pg. 2, K8/Unsplash; pg. 5 and 40, Jennifer Schmidt/Unsplash; pg. 6, 11, 16, and 26, Ella Olson; pg. 10, tbralnina; pg. 12, TheCrimsonMonkey; pg. 24, Cayla1/Unsplash; pg. 25, Alva Pratt; pg. 25, Alexander Kovacs; pg. 35, Edgar Castrejon/Unsplash; pg. 36, Medina Catering; pg. 40, Andrei DZyF; pg. 52, Facundo Ruiz; pg. 60, Deryn Macey; pg. 62, Clem Onojeghuo.

Each World Resources Institute report represents a timely, scholarly treatment of a subject of public concern. WRI takes responsibility for choosing the study topics and guaranteeing its authors and researchers freedom of inquiry. It also solicits and responds to the guidance of advisory panels and expert reviewers. Unless otherwise stated, however, all the interpretation and findings set forth in WRI publications are those of the authors.

WORLD
RESOURCES
INSTITUTE

10 G STREET NE
SUITE 800
WASHINGTON, DC 20002, USA
+1 (202) 729-7600
WWW.WRI.ORG

ISBN 978-1-56973-971-6