MENUS of CHANGE®

The Business of Healthy, Sustainable, Delicious Food Choices

2017 ANNUAL REPORT

THE CULINARY INSTITUTE OF AMERICA®

HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH
Department of Nutrition

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I. MENUS OF CHANGE IN 2017

Welcome to the fifth annual Menus of Change® report. The first years of the Menus of Change initiative have passed quickly as we have worked to engage, inform, and guide the culinary profession and foodservice industry in the business of serving healthy, sustainable, delicious food.

Just five years ago, this report brought together key findings from both nutrition and environmental science along with new culinary strategies. A few years, flips, and blends later—and with the involvement of many culinary and business leaders—our industry has increasingly embraced the vision and advice put forth by Menus of Change. The initiative, a partnership of The Culinary Institute of America and Harvard T.H. Chan School of Public Health, aims to help you successfully navigate a rapidly changing landscape. It does the essential, difficult, and unprecedented work of integrating the latest findings from both nutrition and environmental science into a single set of recommendations to help foodservice and culinary professionals make better choices. Chief among those choices is rethinking the longstanding emphasis of red meat and animal proteins on our plates in order to elevate the role of produce, plant proteins, and other plant-based flavors.

Toward this end, the foodservice industry has rallied around a new vision of plant-forward dining. It's now a focus of menu development and culinary innovation in restaurants of all sizes, formats, and price points. And, as you'll read in this year's report, investors and suppliers both are putting resources into growing new kinds of businesses to meet the rising demand for plant-forward meals and plant-based ingredients to showcase.

The efforts of the many chefs and foodservice operators that have taken up the goals of Menus of Change are now beginning to reshape the American diet. We're seeing modest but positive changes in what we eat, with national indices trailing an abundance of evidence of change among innovators, early adopters, and much of the restaurant dining public. As noted by the "Diet and Health" issue brief (page 26) and the Harvard Alternative Healthy Eating Index, we eat modestly more fruit and less red meat, continuing several years of decline.

Also thanks in significant part to the foodservice industry's leadership on reducing antibiotic use in livestock production, the way poultry is produced in the U.S. has changed tremendously. But antibiotic use in the overall livestock industry continues to increase modestly, with much work remaining to be done in pork, beef, and aquaculture production.

The long-term trend towards more fresh, scratch cooking that started in restaurant kitchens now is having further effects on our industry. The clean label movement seeking to narrow the gap between fresh and processed foods in grocery aisles is now driving change in the supplier community, as discussed in this year's report as one part of the increased focus on transparency.

Overall, as this year's Menus of Change Dashboard shows, changes in what we are eating continue to head in the right direction, but the pace of change is modest when we consider the entirety of the foodservice sector, and American food choices overall. And in the past year, the foodservice industry has wrestled with the tremendous risk and growing complexity of climate change, water scarcity, lack of visibility into supply chains, and other environmental factors that are now affecting everything from lettuce shortages to foodborne pathogens.

This annual report is a core part of the Menus of Change mission. It seeks to advance a long-term, practical vision that integrates optimal nutrition, environmental stewardship and restoration, and social responsibility within the foodservice industry. It includes a guide to the key issues that face the foodservice community, as well as recommendations for improving business performance. It also provides the Dashboard to show the progress the industry has made—where it is moving fast and where it needs to make greater efforts. The indicators on the Dashboard can help businesses evaluate their own efforts in the areas that matter most. For culinary professionals and R&D teams, there is also a comprehensive set of principles to guide menu development and design.

The CIA and Harvard Chan School invite businesses to use this report to measure their progress and to navigate new and complex challenges. Not all culinary professionals and foodservice companies will take the same path forward. But more and more have a similar goal: to be successful in the businesses of serving healthy, sustainable, delicious food.

II. EXECUTIVE SUMMARY: A TASTE OF WHAT'S AHEAD

AS THEY SAY, NECESSITY IS THE MOTHER OF INVENTION. LOOKING BACK OVER THE PAST 12 MONTHS, THIS ADAGE HAS PROVEN TRUE IN BOTH THE FRONT AND BACK OF THE HOUSE.

With regard to new business models, economic constraints throughout the restaurant industry bred growth of a remarkable array of fun, casual concepts. These constraints include shortages of skilled chefs and rising operating costs, and standout new and growing concepts range from New York's Dig Inn and Washington DC's Shouk to San Francisco's Souvla and Los Angeles' Veggie Grill. All of these happen to have a plant-forward bent to boot.

In similar fashion, the growing consensus around the need to reduce red meat in the diet led to an outpouring of innovation around the supply of alternative proteins, from major improvements in veggie burgers—like Impossible Foods' highly anticipated Impossible Burger, a plant-based burger that bleeds, and Beyond Meat's Beyond Burger, a pea-based "raw" burger that sold out in its first hour in a Whole Foods Market test and is now headed for foodservice—to expanded markets for insects, algae, and seaweed.

The reasons for shifting protein consumption patterns are well documented: Animal-based foods contribute disproportionately to the total environmental impacts of food production. In the past year, new studies added further evidence to support the notion that replacing animal protein with plant protein can help prevent chronic diseases. Promisingly, beef consumption in the U.S. is at the lowest level in over two decades, and red meat consumption overall continues to decline modestly. However, overall red meat consumption still remains far above optimal levels for human and environmental health. For example, nearly one in 10 deaths could be prevented in the U.S. if American adults cut their current red meat consumption to less than half a serving per day.

A further sign of progress is that the idea of plant-forward eating moved from a burgeoning term in the prior year to the default phrase for capturing the rising status of vegetables and plant proteins on American menus. Headlines appeared nearly every week highlighting the great work happening in the college and university sector to introduce students to healthier, more sustainable options, from blended burger competitions to savory breakfast bowls and beyond. In March of this year, *QSR* magazine went so far as to run a cover story declaring, "A Plant-Based Future for Foodservice." The article led with this bold summary: "We've reached an era when meatless eating is no longer limited to Mondays. When a charred whole cauliflower can turn as many heads in a dining room as a sizzling, bone-in rib eye. When a growing slice of consumers at the table have at least some idea of the carbon footprint required to produce both of those dishes." Bear in mind, this wasn't *Food & Wine* magazine or *The New York Times* dining section. Instead, this assessment is all the more noteworthy because it came from the vantage point of the quick-service sector.

And this year, we finally sat down to define the beloved term, "plant-forward": *A style of cooking and eating that emphasizes and celebrates, but is not limited to, plant-based foods—including fruits and vegetables (produce); whole grains; beans, other legumes (pulses), and soy foods; nuts and seeds; plant oils; and herbs and spices—and that reflects evidence-based principles of health and sustainability.* (Note the distinction from "plant-based," referring to foods and ingredients, whereas "plant-forward" is reserved for eating patterns and menus.)

As the terminology has been refined, so has the conversation about the power of chefs to impact human and environmental health. While it's worthy of much celebration to see chefs and operators increasing their plant-forward offerings, it's important that they not think of vegetable-centric, plant-forward menus as trends, but rather, a new normal. The reason for this is that, despite a small increase in fruit intake, the potential of fruits and vegetables is

not yet being enjoyed in hard numbers reflecting total national consumption and production. The foodservice industry must continue to move faster still—fostering new menu innovation, scaling great business models—in order to respond to consumer demand while also driving higher consumption of these and other plant-based foods that happen to most benefit their well-being and that of the planet. Furthermore, chefs should not only consider and leverage the overall, healthful halo of plant-forward menus (if actually healthful), but also gain a deeper understanding of the natural resource burdens of producing their ingredients and the nutritional profiles of the various dishes they offer. This two-pronged approach will appeal to more and more customers as time goes on. It will put operators on a more informed, secure footing in terms of preserving brand equity—and it is the right thing to do.

Restaurants and foodservice operations in all categories continue to make serious efforts to reduce food waste, using strategies that blend creativity and technical prowess with energy- and cost-saving measures. The Food Waste Reduction Alliance's fourth food waste assessment report noted "significant progress and investments." Measuring waste—and thus progress in reducing it—remains a challenge for many operators, however, and 49 percent of the survey's respondents did not possess data to report.

The past year also saw leaps forward to address the long-discussed need to make good food affordable for all. There was the launch of Everytable, a Los Angeles-based concept that offers variable pricing depending on the socio-economic status of the neighborhood, and major growth of Boulder, CO-based Modern Market, which uses hyper-detailed operational precision to make dishes driven by premium ingredients available at single-digit price points.

In any industry, in any point in time, change is to be expected. But never before has the *pace* of change in the foodservice industry been so rapid. Consumer demands for transparency and traceability are becoming more and more granular, and the time for food companies to respond is becoming shorter and shorter. So the outcropping of innovation, from business models to protein sources, and the many rigorous sourcing, menuing, and operational initiatives, are all commendable.

And yet, there remain critical areas where the foodservice industry must act *much*, much faster. In particular, there is a need to respond more urgently to water sustainability and climate change. The International Food Policy Research Institute (IFPRI) estimates that nearly half of global gross domestic product (GDP), more than half of the global population, and 40 percent of grain production could be at risk due to water stress by 2050. These are no small matters for the foodservice industry. Much needed rainfall in California this past winter provided relief for regional agriculture, however, it remains troubling that very few examples are emerging of companies in the food sector that are engaging with producers, communities, NGOs, and government partners to consider water supply and water quality impacts of their food sources and menus.

Climate change is a growing threat to the U.S. food system as well. Over the next few decades, temperatures will continue to rise, precipitation patterns will change, and unexpected and unusual extreme weather events will continue to occur. Direct effects on agricultural production are already being felt, particularly as 2016 was the third straight year with record-breaking global temperatures. Heightened attention is being paid too to the indirect effects of climate change on the food system. These include harvesting, processing, packaging, distributing, transporting, refrigerating, retailing, and preparing food, and to new food safety concerns associated with higher ambient temperatures and myriad other factors brought on by changing climates.

On the plus side, we are seeing some gains in animal welfare and use of antibiotics in meat and poultry production. Over half of the major foodservice companies now have in place commitments to reduce or eliminate antibiotic use in their supply chains in the next few years. Perdue Farms became the first major chicken supplier to remove all human antibiotics from its supply chain. This follows the good news that Tyson Foods is also making great progress on the same effort. Missing from most discussions, though, is the distinction among species. Progress in removing antibiotics important to the medical treatment of humans from the production of other meats, such as beef, pork, and shrimp, significantly lags that of chicken. Troublingly, the U.S. Food and Drug Administration (FDA) reported that last year, antibiotic use in U.S. livestock production again increased by one percent, and the use of humanly important antibiotics increased at an even faster rate.

The next reporting cycle of antibiotic sales by the U.S. Department of Agriculture (USDA) will delineate by species, finally providing our industry with the information it needs to focus pressure on the supply chain to reduce antibiotic use.

Given the complexities of change in order to benefit the triple bottom line of people, planet, and profit, the Menus of Change report is designed to give foodservice and culinary professionals the insights and the tools to make informed decisions about difficult issues. The report sifts through culinary trends and innovations to shed light on some of the most intriguing companies and projects happening around the country, all in the name of healthier, more sustainable food. The Menus of Change initiative also importantly provides comprehensive advice and strategies for menu design that support the triple bottom line with the Principles of Healthy, Sustainable Menus. These guidelines outline culinary strategies, such as new focuses on portion size, calorie quality, and plant-based foods, which are needed to increase the success of new business models.

The centerpiece of Menus of Change is a concise analysis of 16 issues at the intersection of public health, the environment, and the business of food. These issue briefs synthesize the latest health and environmental data to provide a clear picture of the industry's challenges and opportunities, as well as practical next steps for foodservice operations. The report assigns each issue an annual score that rates the industry's efforts in these critical areas. Among these 16 issues are:

Land Use and Natural Resource Conservation
New in 2017, this issue is of paramount importance. In thinking about global ecosystem integrity, there is a range of factors to be considered. The most useful global approach is the "planetary boundary" concept—a perspective with nine dimensions to evaluate: climate change, biosphere integrity (functional and genetic diversity), novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biochemical flows (nitrogen and phosphorus cycles), freshwater use, and land system change. We are in need of strategies that include, among others, decreasing livestock production in its current form, as biodiversity preservation in the U.S. and abroad is challenged by both food imports and the extent of land use for agriculture. While much progress is seen in local food sourcing, it is still a limited amount of the total food environment, and more regional production of fruits and vegetables is needed, as are shifts to more seasonal diets. Although soil erosion and phosphorus contamination of surface waters have been reduced, the levels are still far above where they should be.

Changes in Food Industry Investor Standards
For some time now, Menus of Change has been tracking the extent to which the investor community is paying attention to food issues related to nutrition and the environment. Since our last report, health and sustainability have become so widely recognized as important to the financial performance of food sector companies that even "conventional" investors ascribe a higher value to companies that incorporate sound sustainability strategies. Sustainable and responsible investment products now represent about one out of every five dollars invested in the U.S. Formal, standardized methods of benchmarking and valuing company's sustainability performance are now integral to investor analysis, and they mark a new baseline of expectations for anyone looking to launch or grow a business in the food space.

Supply Chain Resiliency and Transparency
The past year saw several advances to make the food supply more transparent, yet also reminders that our food supply is still subject to contamination and wide-scale fraud and misrepresentation. Much of what we eat is misrepresented due to economic adulteration, and food fraud is commonplace in premium products like parmesan cheese, seafood, and olive oil, to name a few. The media has shed much-needed light on the widespread and blatant mislabeling of seafood as well. Over 200 cases of mislabeling were revealed by a 2016 Oceana report, and *Bloomberg Businessweek* detailed an exposé on the use of antibiotics in fish and seafood production.

Overall, the industry is making substantial gains in the right direction: 12 of 16 issues received a score of four (making good progress) or three (holding steady), and improvements were seen in consumer attitudes and behaviors about healthy and sustainable foods, as well as animal welfare. Unfortunately, the industry took a step back with regard to fish, seafood, and oceans, as well as diet and health, which dropped slightly from last year based on the continued increase in adult obesity rates. Garnering the lowest scores of 1 and 2 respectively, water sustainability and climate change remain the two areas of greatest concern.

STATE OF THE PLATE

How are we doing? Sometimes it's hard to tell. The Menus of Change Dashboard on the next page provides a snapshot of the foodservice industry's progress to improve nutrition, sustainability, and profitability. Its scores on critical issues that affect the foodservice industry are updated annually to show where progress is being made. It also creates a set of standards, which are designed to be used by businesses to judge their own efforts on health and sustainability.

Dashboard Score Key
The score assigned to each issue indicates progress or lack thereof in the foodservice industry and/or culinary profession over the last 12 months, as follows:

1: SIGNIFICANT DECLINE OR REGRESS

2: GETTING BETTER, BUT FAR FROM WHERE IT NEEDS TO BE

3. NO SIGNIFICANT PROGRESS

4. GOOD PROGRESS, WITH ROOM FOR MORE

5. SIGNIFICANT PROGRESS

METHODOLOGY

The scores were developed based on the expert opinions of the members of the Menus of Change Scientific and Technical Advisory Council, who considered new research findings and trend data as well as innovations and changes in business practices and policies. The information was then reviewed by members of the Menus of Change Sustainable Business Leadership Council to ensure it reflected new industry initiatives and practices.

CHANGE DASHBOARD

2013–2017 MENUS OF C

ISSUE	SCORES 2017	2016	2015	2014	2013	JUSTIFICATION
INNOVATIONS IN THE FOOD INDUSTRY						Many new and growing restaurant concepts that focus on sustainability, health, and access to quality food are growing strongly. Venture funding is slowing and some new concepts are closing or making compromises.
SUPPLY CHAIN RESILIENCY AND TRANSPARENCY						Restaurant suppliers benefited from improving sustainability, safety, and transparency, including the substantial progress in removing human antibiotics from large-scale poultry production. The federal government increased inspections of imported foods to address fraud. Better traceability could lead to even more benefits.
CHANGES IN FOOD INDUSTRY INVESTOR STANDARDS						Restaurant companies with sound sustainability and risk management programs continue to gain favor from investors. Equity is going into companies that offer solutions like new plant proteins. Investors are concerned about conditions in some countries that supply labor and goods to the restaurant industry and expect greater disclosure.
CHEFS' INFLUENCE ON CONSUMER ATTITUDES						Chefs and operators continue to increase plant-forward offerings and reduce portion sizes. With continued menu innovation and more widespread adoption throughout the restaurant industry, these could become the new normal.
CONSUMER ATTITUDES AND BEHAVIORS ABOUT HEALTHY AND SUSTAINABLE FOOD						Changes in consumer attitudes were mixed, with red meat consumption declining modestly among some, along with increased interest in organic food. The responses to calorie labeling have been mixed.
LOCAL FOOD AND FARM-TO-TABLE						Government policies are finally supporting local foods, a priority spearheaded by America's chefs. The combination of culinary, policy, and business efforts has set the stage for accelerated growth in production and demand.
ANIMAL WELFARE						A year of progress overall, with increased awareness of animal welfare, was thanks in part to efforts of chefs and restaurant companies. Some big livestock producers are now adopting alternative practices, and new policy measures raised standards in some states.
DIET AND HEALTH: RECENT TRENDS						The American diet continued to become healthier with important reductions in trans fats and sugar-sweetened beverages; continued, modest decline in red and processed meat; and a small increase in fruits, whole grains, healthy fats, nuts, and legumes. Recent improvements have yet to curb adult obesity rates.
PORTION SIZE AND CALORIC INTAKE					N/A	Important changes occurred in how we think about our diet with a greater focus on food and calorie quality, rather than low fat or low calorie.
PROTEIN CONSUMPTION AND PRODUCTION						Progress continued in the past year, as red meat production and consumption in the U.S. again declined modestly, while plant-based choices became more widely available on America's menus. Climate change played a role, reducing meat supplies and raising costs, providing the business case for further lowering meat consumption.
FRUIT AND VEGETABLE CONSUMPTION AND PRODUCTION				N/A	N/A	The foodservice industry continues to find new ways to feature fruits and especially vegetables. However, despite a small increase in fruit intake, the potential of fruits and vegetables is not yet being enjoyed in hard numbers reflecting total national consumption and production.
FISH, SEAFOOD, AND OCEANS						The restaurant industry and seafood suppliers continue to provide their customers with high-quality fish and seafood, along with the nutritional benefits of eating more. Challenges continue to include less scrupulous vendors that overpromise and under-deliver on the offer of more sustainable seafood.
CLIMATE CHANGE						More leading chefs and foodservice companies started to think about low-carbon menu options. Change is evident in the industry, but risks from climate change are moving even faster, now causing food safety concerns.
WATER SUSTAINABILITY					N/A	A few leaders in the food industry have begun to pay attention to water issues even as much-needed rainfall in California provided relief for regional agriculture. Faster action is needed as groundwater depletion and long-term drought forecasts in the West and elsewhere could weigh heavily on future profitability.
AGRICULTURE, DRUGS, AND CHEMICALS USE					N/A	Restaurant companies continue to act to protect public health. More companies pledged to source animal products raised without antibiotics. The rate of increased use in livestock production slowed, but use still increased. Regulatory loopholes allowing the use of antibiotics for disease control remain.
LAND USE AND NATURAL RESOURCE CONSERVATION		N/A	N/A	N/A	N/A	This year, soil erosion and phosphorus contamination from farming dropped, although levels are still too high. Food imports and the large amount of land used for agriculture challenge efforts to preserve biodiversity in the U.S. and globally. Local sourcing needs to scale.

OUR VISION

OUR VISION

HEALTHY, SUSTAINABLE, AND DELICIOUS

BUSINESS MODELS AND STRATEGIES

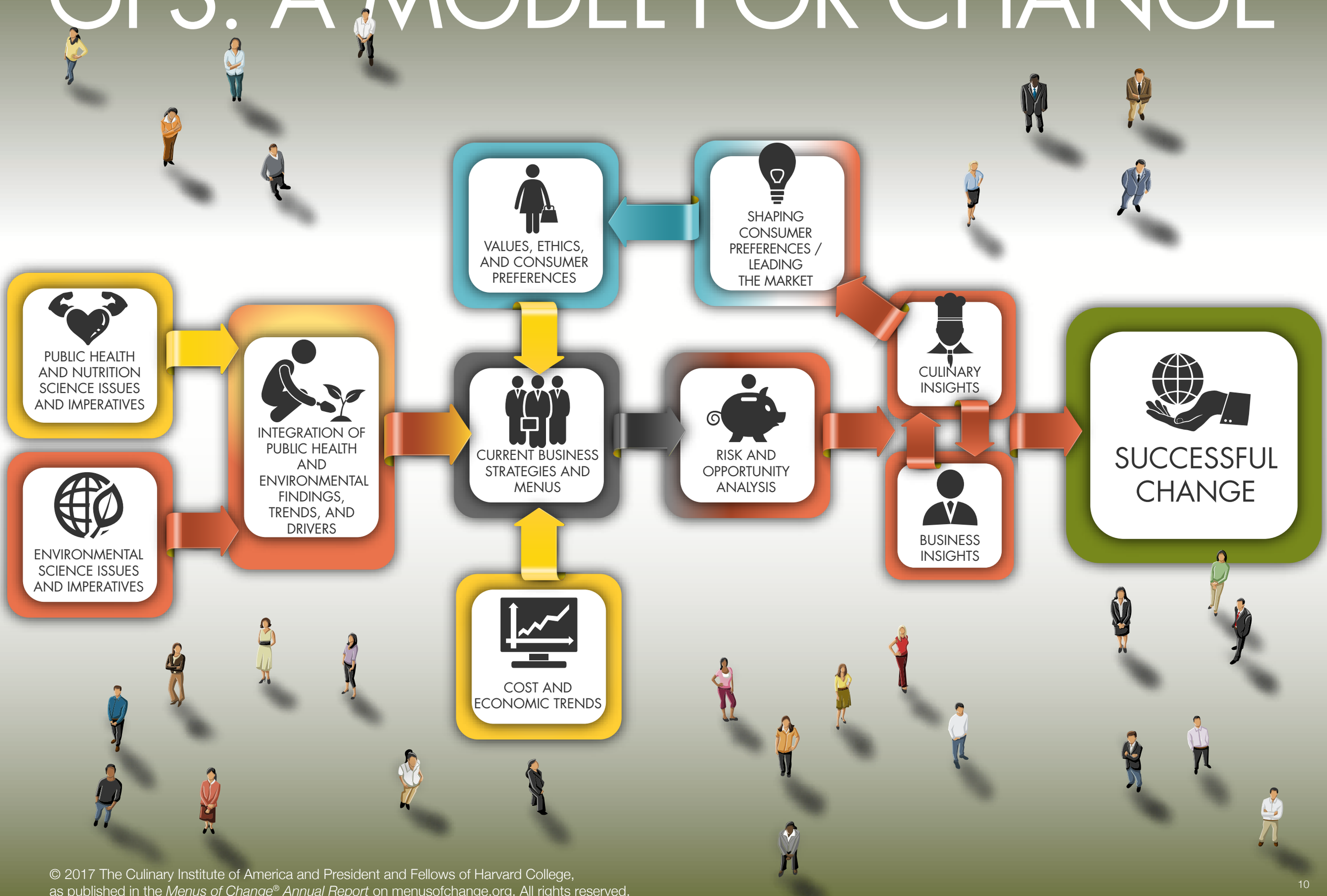
MENUS of CHANGE®

The Business of Healthy, Sustainable, Delicious Food Choices

THE FUTURE OF FOOD

INTEGRATED GUIDANCE FOR BUSINESS AND CULINARY LEADERS

GPS: A MODEL FOR CHANGE



III. DEFINING PLANT-FORWARD: GUIDANCE FOR OUR INDUSTRY

PLANT-FORWARD

A style of cooking and eating that *emphasizes and celebrates*, but is not limited to, plant-based foods—including fruits and vegetables (produce); whole grains; beans, other legumes (pulses), and soy foods; nuts and seeds; plant oils; and herbs and spices—and that reflects evidence-based principles of health and sustainability.

HEALTHY, SUSTAINABLE, PLANT-FORWARD FOOD CHOICES

This distilled guidance about the future of our food choices, for individuals and professionals, is an outgrowth of multiple, joint leadership initiatives of The Culinary Institute of America and the Department of Nutrition at Harvard T.H. Chan School of Public Health, including Menus of Change; Healthy Kitchens, Healthy Lives®; Teaching Kitchen Collaborative; and Worlds of Healthy Flavors. It reflects the best, current scientific evidence supporting optimal, healthy, and sustainable dietary patterns while addressing vital imperatives to achieve short- and long-term global food security.

Healthy, sustainable, plant-forward food choices—when informed by culinary insight—can transform palates and spur next-generation innovation, as is evident in the success of new menu, restaurant, and retail product concepts thriving in the marketplace. In short, this is a practical, achievable vision for a delicious future. For more information, please read the Principles of Healthy, Sustainable Menus at www.menusofchange.org.

HEALTHY, SUSTAINABLE, PLANT-FORWARD FOOD CHOICES ARE THOSE WHICH:

- Center around minimally processed, slow-metabolizing plant-based foods: fruits and vegetables (produce); whole grains; beans, other legumes (pulses) and soy foods; nuts and seeds; healthy plant oils; and herbs and spices. For protein sources, such choices lead with plant protein.

- Can include animal-based foods in a reduced (optional) role, with a special emphasis on decreasing purchases of red meat and minimizing foods sourced from animals raised with the routine, non-therapeutic use of antibiotics. These choices prioritize fish and poultry among animal-based proteins, with dairy options and eggs playing a supporting role (if desired).

- Highlight the value of fresh, seasonal, locally produced foods; minimize sugary beverages and added sugars and sweeteners; and reduce sodium and unhealthy additives.

- Emphasize healthy dietary patterns and a rich diversity of whole foods versus an undue focus on specific nutrients and percentages; avoid excess quantities of calories but first ensure calorie quality.

- Celebrate cultural diversity, personal needs and preferences, and the unapologetic elevation of deliciousness, including room in our diets for foods of special occasions.

- Begin with transparent ingredient sourcing that supports sustainable farming methods and fisheries.

- Through food purchasing patterns, encourage innovation and sustainable practices in retail food and restaurant concepts and business models to advance public health, social well-being, and our food system.

WHAT'S IN A NAME?

To help communicate with your customers and the media about the distinctions between different menu strategies that leverage vegetables, fruits, nuts, legumes, whole grains, and plant proteins in leading roles, we've settled on some naming protocols. Let us know what you think.

- ***Plant-Forward***: Please see definition on the right. Often used synonymously with "vegetable-centric," "vegetable-forward," and "plant-centric."

- ***Plant-Based***: Used to refer to ingredients and foods themselves, i.e. fruits and vegetables (produce); whole grains; beans, other legumes (pulses), and soy foods; nuts and seeds; plant oils; and herbs and spices. Different from "plant-forward," which refers to the style of cooking and eating that emphasizes and celebrates these foods, but is not limited to them.

- ***Vegetarian***: Dishes that do not contain meat or fish but may, or may not, contain dairy, eggs, and/or honey, and individuals who do not eat meat or fish but may, or may not, eat dairy, eggs, and/or honey.

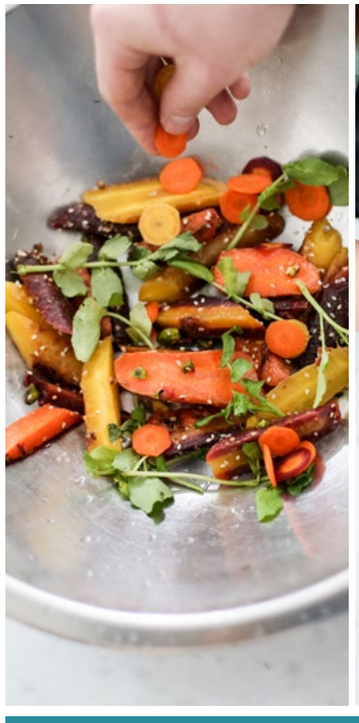
- ***Vegan***: Dishes that do not contain any ingredients that came from animals, or individuals who do not eat any ingredients that came from animals.

- ***Flexitarian***: Describes individuals whose primary eating pattern does not contain meat but may occasionally include meat or fish.

IV. GREEN SHOOTS: DELICIOUS SIGNS OF CHANGE

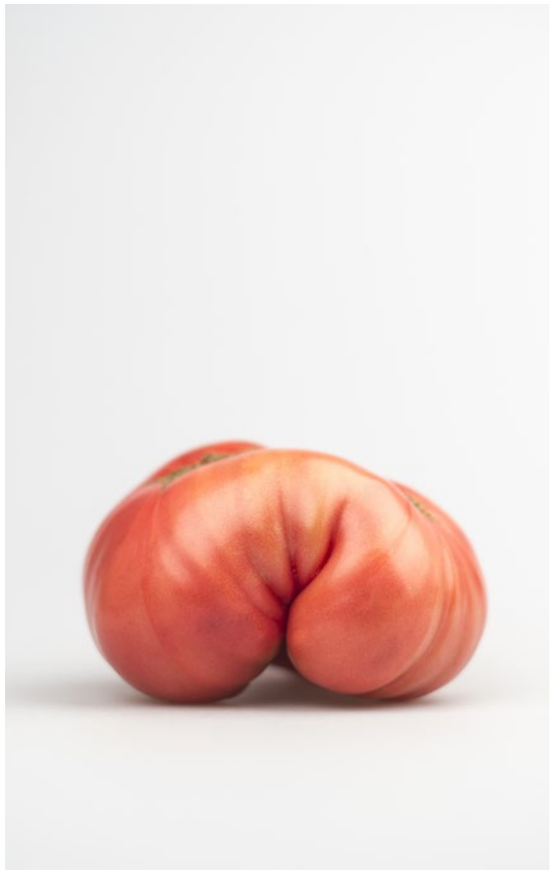
Over the past year, the trend towards locally sourced, plant-forward, seasonal, convenient food continued to grow rapidly. Restaurants also proved that you can make good food affordable and accessible to everyone. Building on last year's momentum, innovations to reduce food waste continued to proliferate, and the business case for food waste reduction became clear: Restaurants and foodservice providers could save $1.6 billion in food purchasing costs annually by reducing food waste, according to a new report by ReFed, a nonprofit using data and economics to reduce food waste in the United States. Finally, foodservice operators, restaurants, and retailers embraced plant-based protein alternatives to animal protein. While these alternatives account for less than one percent of the meat market, startups are launching new products that look, cook, and taste like beef, in hopes of winning over omnivores. Tyson Foods also made moves by taking a five percent stake in Beyond Meat. This marks the first time a major meat company has invested in a plant-based food company. *For a deeper dive into the most cutting-edge business models and areas of market growth within the world of healthy, sustainable foodservice, please see the issue brief "Innovations in the Food Industry" on page 17.*

Photo by Christian Harder



Going a step above most, New York-based Dig Inn bought an R&D farm to grow some of its own produce, train its chefs, and experiment with organic agriculture and aquaculture.

Imperfect produce went mainstream in the past year, crossing over from restaurant kitchens to retailers like Whole Foods Market, Walmart, and Hy-Vee, which began pilot programs.



Veggie Grill, a West Coast vegan chain with 28 units, raised $22 million to double in size within three years.

Photo by Todd and Diane Porter

Photo by Vanessa Stump

Photo by Giselle Guerrero

Impossible Foods debuted its highly anticipated Impossible Burger, a plant-based burger that bleeds, at David Chang's Momofuku Nishi in Manhattan last summer. The company is partnering with high-end restaurants such as Cockscomb and Jardinière in San Francisco, and Crossroads Kitchen in Los Angeles.

Los Angeles-based Everytable launched to make healthy food accessible by offering variable pricing depending upon the socio-economic status of the neighborhood.

A TASTE OF THE FUTURE: INSIGHT FROM THE OFFICE OF WIRED MAGAZINE

A Q&A with Joanna Pearlstein, Deputy Managing Editor, WIRED

WHEN IT COMES TO THE FUTURE OF FOOD…

What are you most concerned about?
California grows the bulk of the nation's produce, and we've faced a drought for years. Even this year's deluge of rain isn't going to eliminate the West's drought, long-term; that's because climate change is causing the temperature to rise, which means more run-off and changes to the groundwater supply.

As a result the state's farmers need to continue to adopt farming measures that use water conservatively, and smartly. Nuts are often an agricultural scapegoat when it comes to water consumption. They're a big industry—California's almond crop contributes $11 billion to the state's economy each year—and tree nuts are notoriously thirsty. So farmers need to consider the best way to maintain their yields but reduce water consumption. The same goes for avocados, actually—they need tons of water, and California supplies 83 percent of the nation's stash. If farmers don't find ways to grow food more efficiently in the face of unstoppable temperature rise, we'll see a substantial change in what's available in our grocery stores and restaurants.

What are you most excited about?
I live in San Francisco, which some consider to be the epicenter of the local, organic, yadda yadda movements. In California we're incredibly blessed to be able to eat locally, since so much food is grown here. But I feel like across the country people are starting to appreciate what's grown in their neck of the woods. To me a huge part of eating locally is simply the carbon cost of the alternative: right now if I want to buy fruit at my local Whole Foods, I can spend $6 on four ounces of blueberries grown in Chile, or $3 on a pound of tangerines grown within a few hundred miles of my home. It seems that consumers are beginning to understand that their food choices have environmental impacts and are acting accordingly, which is why you see signs boasting "local!" in supermarket produce sections. And the new efforts to grow food in vertical gardens have real promise for city-dwellers who want to get into urban farming.

Then there's the meat issue—animal protein, especially beef, has huge carbon costs. We've seen a lot of startups marketing a new generation of meatless proteins; a company called Impossible Foods in the Bay Area has a meatless burger that tastes really quite good.

My one concern about the new generation of meatless products is that it's still important to consider the impact of their manufacturing: Sure, raising a cow for meat requires a lot of food, and water, and produces a lot of methane. But making a drink out of pea protein or a burger out of soybeans still requires energy, so my question is always, what do the carbon footprints of these products look like?

Joanna Pearlstein, Deputy Managing Editor, WIRED
Photo by Joe Pugliese

What will be the most significant difference(s) in what and how we eat compared with what and how we eat today?
It seems that companies like Blue Apron, which helps people prepare full meals by delivering pre-selected and measured ingredients along with recipes, are getting consumers who are either too busy or intimidated to prep their own food back in front of the stove. It's not clear whether the emergence of these kinds of companies will encourage people to become more independent in the kitchen, or if people will simply become dependent upon others making decisions for them. The companies claim meal-delivery services reduce food waste, which is likely true; who among us hasn't bought a head of celery only to use two stalks, and then thrown the remainder into the compost two weeks later? But if you get your dinner from a service like Blue Apron, all of the ingredients will come in little bags or containers. Is putting all that packaging into your recycling bin really better than the waste created when you buy too much celery?

The issue of sugar has gotten a lot of attention as well, thanks to the great work of the journalist Gary Taubes in his new book *The Case Against Sugar*. He documents how the food industry essentially conspired to demonize fat while letting the considerable nutritional problems with sugar off the hook. Just as a few decades ago, news of the evils of saturated fat prompted the removal of fat from many foods in the grocery store (which didn't necessarily make the reimagined, fat-free cookies any better for you), perhaps now more companies will begin removing added sugar from their products, which would be a boon to consumers' health. Nestlé recently pledged to remove sugar from some products it sells in Europe, for example. This would be a great time for some researcher to unveil an awesome sugar substitute that tastes good, doesn't cause cancer, doesn't raise blood glucose levels, and performs well in cooking.

What will be the most significant difference(s) in the foodservice industry specifically, and in the consumer experience of eating outside the home?
It seems the trend of gluten-free, dairy-free, soy-free, etc., isn't going away. From my viewpoint the food industry has done a pretty good job of addressing the nation's ever-growing dietary restrictions. I'm impressed at how many restaurants make clear what's available for people who can't eat dairy or gluten. My question is, what innocent ingredient that's lurking in my pantry will be the next nutritional villain? It could be sugar, which would likely be quite challenging to the packaged foods industry. Or it could be salt, which would really test the creativity of restaurant chefs.

Give us a sense for the ways that technology is shaping the future of food. We all read about any number of advances in technology—between robotics and precision agriculture, big data and genomics, what are the technologies that you think are likely to change the food system and how we think about food within the next five years?
I hope it's less about finding new ways to process foods and more about growing foods in more innovative and sustainable ways. Robotics may help improve the efficiency of farms; genomics and drought-smart watering can drive higher agricultural yields and lessen the environmental impacts of pesticides and herbicides. New systems for vertical farming may help bring the process of growing food back into more urban communities. The march toward always-on internet access for many people will hopefully allow consumers to learn more about the nutritional content and origin of their foods, and help them find new ways to prepare it.

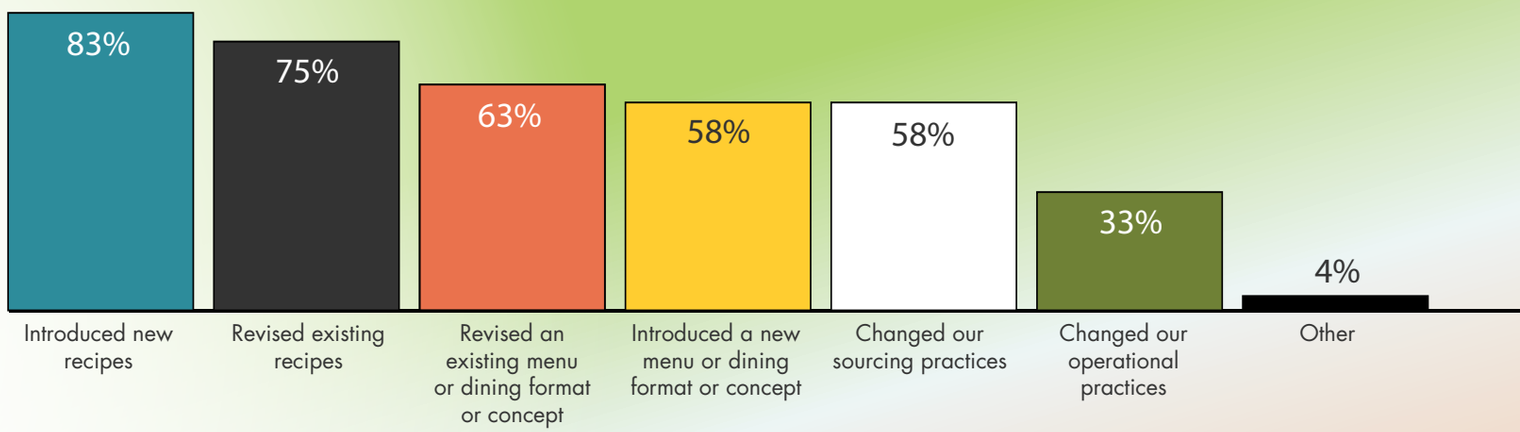
V. MENUS OF CHANGE IMPACT SURVEY

Menus of Change is deeply committed to the measurement of change: What impact is the initiative having on the foodservice leaders who engage with it, and on the industry as a whole? In its annual survey of attendees of Menus of Change leadership summits, the CIA aims to find out how operators use the initiative's guidance throughout the year. Respondents are based in locations throughout the United States and represent operations ranging from casual restaurants to fine dining, from catering and healthcare/senior care to corporate dining and college and university foodservice.

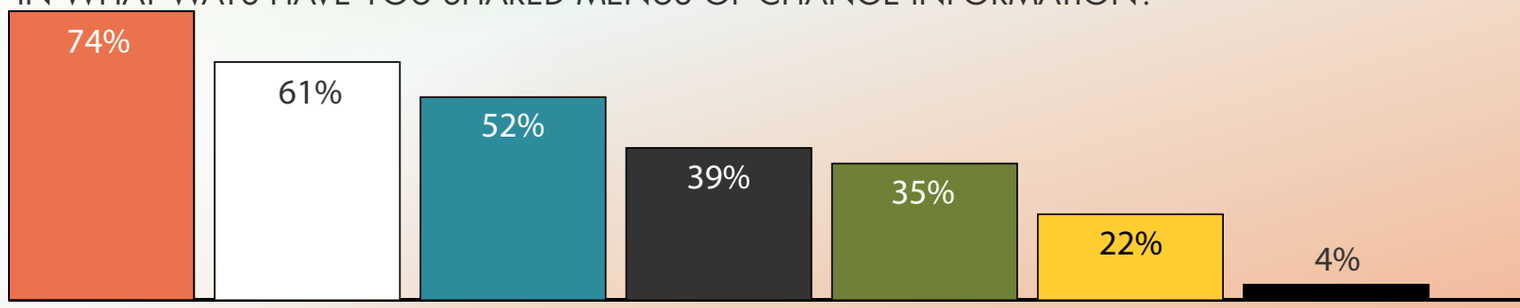
A remarkable 96 percent of respondents to the 2017 survey had acted on the guidance provided by Menus of Change. Among those who had made a change of some kind, 83 percent had introduced new recipes; 75 percent had revised existing recipes; 63 percent had revised an existing menu or dining format or concept; 58 percent had introduced a new menu or dining format or concept, and the same proportion had changed sourcing practices; and 33 percent had changed operational practices. Encouragingly, among those who had made a change, one third had done so across their entire operation, and over half had made the change at multiple locations.

Ninety-two percent of respondents had also shared information from Menus of Change with others. For those who had shared the information, 74 percent had shared it with coworkers through a presentation, and 61 percent had done so digitally; 52 percent had presented to their senior leaders or owners, and 39 percent had done so to their customers or clients; 35 percent had conducted a formal training for coworkers, and 22 percent had presented to their suppliers.

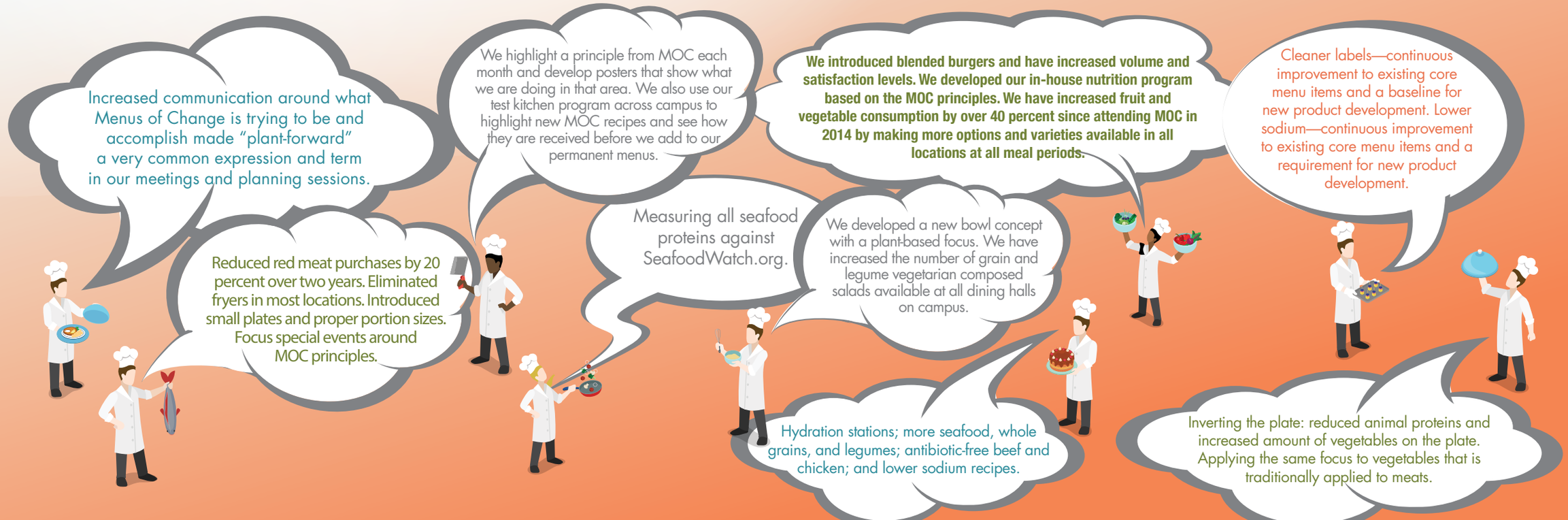
HOW HAVE YOU ACTED ON GUIDANCE PROVIDED BY MENUS OF CHANGE?



IN WHAT WAYS HAVE YOU SHARED MENUS OF CHANGE INFORMATION?



HERE ARE SOME HIGHLIGHTS OF THE CHANGES THAT HAVE TAKEN PLACE AT OPERATIONS WHOSE LEADERSHIP HAS BEEN INSPIRED BY MENUS OF CHANGE:



VI. BUSINESS IMPERATIVES: THE CHANGING CALCULUS ON COSTS, RISKS, AND OPPORTUNITIES

This section provides insights and advice on innovation, investment, and supply-chain resiliency to help culinary professionals and the industry move more quickly in the right direction. In short, evidence of investment and innovation in the foodservice industry was abundant throughout the past year. Just as there is a strong appetite for healthy, sustainable food, so there is an exceptionally strong market for investment products that focus on those themes. Four sustainability themes have garnered the greatest investment interest over the past year: antibiotic use and contamination in livestock production, employee wages, lobbying, and supply chain concerns. In addition, investors are pushing for more plant-based protein and protein innovation in food companies generally.

In 2016, 38 institutional investors asked key food producers and restaurants to transition to more plant-based protein, primarily in the interest of consumer health and environmental constraints. All of which occurred at a time when foodservice operators, restaurants, and retailers have enthusiastically embraced plant-based protein alternatives to meat protein.

Not to be overlooked were continued innovations to reduce food waste, which built on much momentum from the previous year. Operators should take advantage of all opportunities to improve their bottom lines by reducing waste, including adopting waste tracking analytics, adopting smaller plates, going trayless, incorporating imperfect produce into menus, and donating unused food for tax deductions.

With regarding to risk management, however, this past year brought great media focus on the concerning issue of food fraud. Exposés revealed overt mislabeling and adulteration of premium products like parmesan cheese, seafood, and olive oil, among others. Improved food traceability is needed more than ever to satisfy customer demands and to ensure restaurant and foodservice operations reach long-term sustainable sourcing goals.

INNOVATIONS IN THE FOOD INDUSTRY

The foodservice industry continued to undergo dramatic change in the past year as consumer demand grew for food choices that are healthy, transparently sourced and prepared, and readily available. From new business models to software and hardware, new and established companies are developing products and services that aim to help foodservice professionals improve margins, efficiencies, and environmental sustainability.

Restaurant Innovations

The trend towards locally sourced, plant-forward, seasonal, convenient food continued to grow rapidly. Sweetgreen, a farm-to-table salad chain with 64 locations and $95 million in funding, added 33 locations in 2016. Veggie Grill, a West Coast vegan chain with 28 units, raised $22 million to double in size within three years. Dig Inn launched a training program for cooks to overcome the challenge almost every restaurant is facing: a dearth of skilled cooks. It is also bought an R&D farm to grow some of its own produce, train its chefs, and experiment with organic agriculture and aquaculture.

Last year, restaurants proved that you can make good food affordable and accessible to everyone. Roy Choi and Daniel Patterson launched Locol (named 2017 Restaurant of the Year by the *Los Angeles Times*), their West Coast burger chain, using high-quality ingredients and paying employees a living wage. Its cheeseburger costs just $5, which is possible through a blended patty of 70 percent beef and 30 percent soy and grains. (Blended burgers are among the key strategies in The Culinary Institute of America's *Protein Flip* resource.) Los Angeles-based Everytable launched to make healthy food accessible by offering variable pricing depending upon the socio-economic status of the neighborhood. In its South LA location, for example, it offers salads and other items for less than $5. When it opens its second location in the more affluent downtown LA, it will offer those same items for $8 to subsidize the lower priced items at its restaurants in lower income neighborhoods. Kimbal Musk also bet on healthy fast food with the launch of Kitchenette, which serves sandwiches, soups, and salads for under $5 in Memphis, TN.

Next-generation delivery-only restaurants like Sprig, Maple, and Munchery raised tens of millions of dollars in 2015. In 2016, however, they faced growing pains as they grappled with the unit economics and logistics of scaling food production and delivery. Sprig halted operations in Chicago. Two-year old Maple made just two percent gross margin profit and raised a down round before closing in 2017. Munchery was reportedly hemorrhaging money on marketing and food, to the tune of $5 million a month for months, while wasting 16 percent of its meals. To improve margins, it reduced ingredient costs by buying conventional rather than organic ingredients, hired a new CEO, and let go of 30 employees. Beyond the success of market leader Blue Apron, it remains to be seen whether these other "Gen 1" companies can grow into profitable, sustainable businesses.

Finally, the meal kit market continued to grow, with over 150 U.S. companies reaching $1.5 billion in sales. Whole Foods Market, *The New York Times*, and even Martha Stewart launched partnerships with meal kit companies.

Food Waste Innovations

In 2016, the business case for food waste became clear: Restaurants and foodservice providers could save $1.6 billion in food purchasing costs annually by reducing food waste, according to a new report by ReFed, a nonprofit using data and economics to reduce food waste in the United States. The largest savings can be realized through the use of waste tracking and analytics technology to identify and address operational inefficiencies in food purchasing and kitchen preparation. Another area of cost savings is implementing smaller plates and removing trays, which encourages consumers to waste less and can reduce an operator's food purchase costs. Using imperfect produce allows for lower input costs since it can substitute for retail-grade, cosmetically perfect food. Finally, food donation programs are an opportunity for operators to reap benefits from tax credits.

Building on last year's momentum, innovations to reduce food waste continued to proliferate. LeanPath, a provider of food waste tracking and analytics software and hardware, saw increased adoption from industry leaders like Aramark and Google. With $2.5 million in funding, Spoiler Alert launched a platform to help food businesses create or recover value from otherwise wasted food and unsold inventory by creating and managing food donations and discounted food sales. Imperfect produce also began to go mainstream in 2016 as retailers like Whole Foods Market, Walmart, and Hy-Vee began pilot programs.

Of note, the past year also saw growth in the number of food manufacturers launching products with ingredients that would otherwise go to waste. Sir Kensington's, for example, launched Fabanaise, a vegan mayonnaise made from acquafaba, or chickpea cooking water. Cold-pressed watermelon juice brand WTRMLN WTR, which uses imperfect melons that cannot be sold in a grocery store, secured funding from Beyoncé, saw over 300 percent growth in 2016, and expanded to over 15,000 stores. Baldor Specialty Foods, a Northeast produce processor and distributor, diverted 100 percent of its organic processing waste from the landfill through value-added products and partnerships. It sells misshapen produce to MISFIT Juicery, a Washington, DC-based cold-pressed juice brand. Baldor also developed a line of soups, sauces, and cookies with Haven's Kitchen, and remaining items are converted into animal feed or processed within an on-site waste-to-water system.

Plant-Based Protein Innovations

Foodservice operators, restaurants, and retailers embraced plant-based protein alternatives to meat protein. While these alternatives account for less than one percent of the meat market, startups are launching new products that look, cook, and taste like beef, in hopes of winning over omnivores.

Impossible Foods finally debuted its highly anticipated Impossible Burger, a plant-based burger that bleeds, at David Chang's Momofuku Nishi in Manhattan last summer. The company is partnering with high-end restaurants such as Cockscomb and Jardinière in San Francisco, and Crossroads Kitchen in Los Angeles.

Beyond Meat launched Beyond Burger, a pea-based "raw" burger, to much fanfare. Going after omnivores, Whole Foods Market tested the patties in the meat case of a Boulder, CO store. The product sold out in one hour and is now being sold in 51 of its stores. With an eye on expanding into foodservice, the company partnered with Veggie Grill to offer its burger at the West Coast–based chain's 28 restaurants.

Hampton Creek, maker of plant-based protein products like Just Mayo, fell from grace after *Bloomberg* reported that the company had been buying back large quantities of its products from stores in order to boost its sales numbers for retailers and investors. The U.S. Securities and Exchange Commission and the Justice Department launched probes into the start-up's possible securities violations and criminal fraud in August. The investigation was ultimately dropped in March 2017.

Corporate Investment Growth

The capital flowing into global food and ag tech startups from venture and angel investors began to slow. In 2015, a series of high-profile valuations, acquisitions, and IPOs, as well as high-profile investors, helped to boost investor confidence in food e-commerce and agriculture with $4.6 billion raised across 526 funding deals. This past year, however, saw a 30 percent decrease in investment, with $3.23 billion investment across 580 deals in 2016. Of note, the total number of deals increased by 10 percent, driven by increased investments in seed-stage startups.

Deal flow may have slowed, but there were still many encouraging signs of progress. Thirty-two new food and agriculture funds launched in 2016. There was also growth in corporate venture capital funds. One such example is Acre Ventures, a $125 million venture fund launched by Campbell's. The fund made five investments, including Juicero, Farmers Business Network, Back to the Roots, Spoiler Alert, and Sample6. Tyson Foods also made moves by taking a five percent stake in Beyond Meat. This marks the first time a major meat company has invested in a plant-based food company. In addition to providing capital, Tyson will also use its scale to support the start-up through its production and distribution capabilities.

While it is encouraging to see continued investment in food, many are concerned that start-ups continue to be overvalued. For instance, Juicero, a $700 cold-pressed juicing system for the home, raised $120 million from top Silicon Valley investors before even having a product.

RECOMMENDATIONS:

Health, environmental sustainability, and convenience continue to present some of the greatest opportunities for growth in the foodservice industry. Operators should continue to embrace new menu techniques, technologies, and business models to help reduce food waste, enhance convenience, and improve access. Operators should improve convenience and accessibility by exploring new formats and partnering with third-party mobile ordering and delivery options. Additionally, operators should seek out partnerships with emerging companies that can help them meet consumer demands.

SCORE: 4

A growing number of start-ups focused on environmental sustainability, health, and accessibility launched or saw positive growth over the past year. Despite the increase in technologies, services, and business models available to foodservice professionals, however, many start-ups still have yet to prove their businesses models, relying on venture capital to drive growth. As funding slowed down, a number of alternative dining start-ups shuttered or compromised environmental sustainability for margins.

IN SUMMARY:

- More consumers are increasingly looking for convenient, affordable, plant-forward food. Chefs and operators should seek out collaborations and investments in emerging companies that could benefit from their infrastructure and experience to serve fast-changing consumer demand.

- Operators should take advantage of all opportunities to improve their bottom lines by reducing waste, including adopting waste tracking analytics, adopting smaller plates, going trayless, incorporating imperfect produce into menus, and donating unused food for tax deductions.

- Despite the significant amount of capital being invested in food and agriculture startups, some argue that companies cannot support the valuations at which companies are raising capital. Many of these startups have yet to demonstrate profitability.

SUPPLY CHAIN RESILIENCY AND TRANSPARENCY

In 2016, there was a series of advances in making the food supply more transparent, yet also reminders that our food supply is still subject to contamination and wide-scale fraud and misrepresentation.

The U.S. Food and Drug Administration (FDA)'s Food Safety Modernization Act saw some of its most important components go into effect in 2016, including the Foreign Supplier Verification Programs and Third Party Certification, which "requires that importers perform certain risk-based activities to verify that food imported into the United States has been produced in a manner that meets applicable U.S. safety standards." Still, the scale and complexity of this act has also brought extensions to parts of it, meaning that full compliance is not expected before 2019. Nonetheless, it is a move in the right direction, given that the U.S. imports about 19 percent of its overall food supply from other countries, including 80 percent of its seafood, nearly 52 percent of the fresh fruit, and 22 percent of fresh vegetables. The oversight and the role of the FDA in insuring that internationally sourced food meets U.S. standards is a first and powerful change that brings greater attention to food safety.

Concern over the use of human antibiotics in the production of meat and seafood increased in importance. A *Bloomberg Businessweek* exposé highlighted the extensive use of antibiotics in some farmed fish and seafood production, along with mislabeling of products. And, in its second annual report, "Chain Reaction," Friends of the Earth reported that many quick-service restaurants have made significant commitments to using antibiotic-free chicken. Indeed, Perdue Farms became the first major chicken supplier to remove all human antibiotics from its supply chain. This follows the good news that Tyson Foods is also making great progress on the same effort. However, progress in removing antibiotics important to the medical treatment of humans from the production of other meats, such as beef, pork, and shrimp, significantly lags that of chicken. Troublingly, the FDA reported that last year, antibiotic use in U.S. livestock production again increased by one percent, and the use of humanly important antibiotics increased at an even faster rate. (For more on this topic, please see the issue brief on page 43.)

This past year also brought great media focus on fraud in food, with many reports in leading newspapers reporting on the widespread and blatant mislabeling of seafood. Many reports showed the meat in lobster-labeled dishes is often langoustine, shrimp, or even imitation lobster (whitefish). Overall, insufficient progress has been made in seafood fraud. Additionally, many reports on the adulteration of grated parmesan cheese—detailing how cellulose or silicone fillers are regularly used not to just control moisture and clumping but also cut the amount of expensive cheese in the product, effectively cheating customers of the real product—received great attention in many media outlets, prompting FDA investigations. These investigations revealed that some national "grated parmesan cheese brands" did not contain parmesan cheese at all, but were made with imitation product. Olive oil was also shown to be impacted by food fraud, as many leading olive oils were shown to contain soy and sunflower oil. The Michigan State University Food Fraud Initiative highlighted that "economically driven adulteration" can come from replacement, removal, and addition, and such adulteration is rarely accidental, but deliberate. This assessment further reminds us that food tracing is more needed than ever. The word is out: Across a range of products, food is full of fraud, and consumers are looking for greater proof of origin and truth in labeling.

Another reminder that the consumer really is the final judge in the importance of trustworthiness in food can be seen in the 13 percent decline of Chipotle sales in 2016 compared to 2015, as the company continues to struggle in winning back customers stemming from its food safety issues. Comparable restaurants' sales have been trending up lately, however, and the company is forecasting future growth again.

The consumer expects a safe, truthful, and transparent food product. Deviations from that remain and continue to weigh on the integrity of the food supply as increased quality occur alongside continued misrepresentation. Supply chain improvements may be underway, as some large food companies—such as McDonald's with its focus on six priority products ranging from palm oil to packaging—commit to reform. Food products are: beginning to be measured and examined with greater detail, still not easily examined or audited, and subject to more sourcing inquiries by consumers. These features suggest that far greater food traceability is needed to satisfy customer demands.

RECOMMENDATIONS:

- Improved food traceability is needed more than ever to satisfy customer demands and to ensure restaurant and foodservice operations reach long-term sustainable sourcing goals.
- Traceability information about where and how food ingredients are produced needs to be timely and embedded in existing supply chain and ordering practices.
- Operators must work with their suppliers to ensure authenticity of ingredients. Chain of custody certification is one way to avoid fraud and adulteration.
- Long-term commitments to improvement by suppliers—such as reduced use of antibiotics—should be monitored through frequent updates and reporting on progress.

SCORE: 3.5

Consumers are seeking more information and guarantees about the food they eat, as seen in the increased demand for clean ingredients, such as antibiotic-free and GMO-free products. This reality drives a greater need for transparency in the food supply, which remains especially vulnerable to food fraud and overt mislabeling. The food industry still needs greater traceability information to meet customer demands around food sourcing. Advances in removing human antibiotics from various poultry sources show that an emphasis on food sourcing, safety, and transparency has great value to consumers. Economic challenges remain in making food transparency viable and beneficial to food suppliers at all price points, which has inhibited the broader roll-out of technology related to food tracking.

Additionally, large-scale food safety issues still occur with some regularity. Threats to the safety of food exists not just in its handling but also in its origin and preparation. The FDA Food Safety Modernization Act is a step in the right direction to monitor food safety and to improve the resiliency of the U.S. food supply.

IN SUMMARY:

- Greater scrutiny of the international food supply imported to the U.S. will soon be in place.

- Food fraud is being exposed. Much of what we eat is misrepresented due to economic adulteration, and food fraud is commonplace in premium products like parmesan cheese, seafood, and olive oil, to name a few. Frequently, restaurants do not know that they have been duped.

- Consumers will penalize companies for food safety issues, showing that safety, trust, and transparency in the food supply mean a great deal to consumers.

CHANGES IN FOOD INDUSTRY INVESTOR STANDARDS

Investors place significant and growing weight on the health and sustainability profiles of food companies when calculating company value. These evaluations in turn inform investors on whether or not to buy company stock, make investments in a start-up business, or engage with company management in order to improve sustainability performance. The trend toward greater adoption and standardization of environmental, social, and governance (ESG) criteria in investment is well established. For example, sustainable investing grew 33 percent over the past two years in the U.S., to a total of $8.72 trillion of assets under management, or roughly one out of every five dollars invested. In addition, most "conventional" investors who do not identify themselves as having a brand or investment theme of sustainability also favor food companies with superior ESG performance, ascribing a higher value to food companies with better food safety and labor relations performance, for example.

Investors are employing new funding models to in turn push for greater automation and innovation within the restaurant industry. For example, angel and mom-and-pop crowdfunding sites provide new potential revenue for start-up restaurants. The site EquityEats pays foodie investors back through meals at the restaurants they've invested in. Online delivery—even by a robot that navigates city streets in one pilot project run by PostMates—is now key to urban restaurant business models. These technologies have led to automated ordering and payment in-store, including in chains like McDonald's that have long prided themselves on being a major global employer. Many of these changes are driven by an interest in speed and efficiency, and in response to minimum wage increases. The question remains if restaurant jobs will be professionalized as a result, leading to fewer workers with higher skills and wages, or simply reduced to as few workers as possible. Finally, investors are pushing for more plant-based protein and protein innovation in food companies generally. In 2016, 38 institutional investors asked key food producers and restaurants to transition to more plant-based protein, primarily in the interest of consumer health and environmental constraints.

Investors continue to see a strong upside to certain sustainable restaurant and food trends. For instance, over the past year many private equity investors rewarded alternative protein start-ups. Investors prefer companies with innovative approaches to sustainability that enhance brand value, drive growth, reduce operating costs, or reduce regulatory or supply chain risk. And investors increasingly tie sustainability performance to management quality. Four sustainability themes have garnered the greatest investment interest over the past year: antibiotic use and contamination in livestock production, employee wages, lobbying, and supply chain concerns.

Investors recognize overuse of antibiotics as a significant risk. The World Health Organization (WHO) warns of a global "post-antibiotic era," rendering treatments less effective, and harming both human and animal health. In the U.S., antibiotics have long been used as a means to enable intensive animal farming practices and increase growth, yet the business case for using these antibiotics is tenuous. A 2015 study by the U.S. Department of Agriculture and a 2015 WHO study found that limiting antibiotic use for growth purposes may affect production and prices by less than one to two percent, while providing significant benefits in terms of consumer favorability and workplace safety. In 2016, Perdue Farms led the industry by eliminating all routine uses of antibiotics, and reported that only five percent of chickens were receiving any antibiotics. In light of these findings in 2016, a global coalition of 60 institutional investors representing over $2.2 trillion of assets under management called on the ten largest restaurant companies to end the non-therapeutic use of antibiotics in their supply chains. Investors also recognize the existing risk of contamination, as reports of antibiotic-tainted shrimp, for example, raise concerns about severe product safety risk.

Many investors are also concerned about restaurant employment and wages. Some have made the case that higher wages may lead to overall cost savings, such as through lower turnover, improved training and customer experience, and food safety. But without full disclosure of employee metrics, investors may be uncertain as to these trade-offs. Last year, several investors asked company management for reports on how wages are calculated, and the impact of minimum wage reform. Although the Trump administration has sent mixed signals on the issue of increasing the minimum wage, it seems likely that any federal increases would be minimal. Investors may increase attention in this area in order to avoid risk that is not handled through regulatory or policy tools.

Corporate political spending and lobbying are also of concern to many investors, prompting them to file more than 370 shareholder proposals on this issue—more than on any other topic—from 2014 through 2016. In particular, these shareholders are wary of companies that support lobbying or political action committees that undermine stated corporate sustainability policies, such as lobbying efforts to erode public trust in climate change science.

Investors continue to be concerned about environmental and supply chain risks, such as agricultural stress from water scarcity, extreme weather events, forced labor, and political instability around the world. These risks—especially in developing countries where many tropical ingredients are sourced—are intertwined. For example, climate change and drought exacerbate political instability, migration, and human rights abuses. Many key ingredients that drive growth and value—such as coffee, chocolate, and maple syrup—are at risk of losing habitat or farmland, and driving up prices to the luxury level. Investors seek companies with innovative solutions to these problems (such as new farming techniques) and those that work in partnership to mitigate and adapt to these conditions.

RECOMMENDATIONS:

The importance of clear communication and consistency of food company sustainability goals and practices has never been more important. All investors will look at issues like food safety, and the growing number of sustainability-themed investors will look for a company's strategy across a suite of issues, such as antibiotics and water use in the supply chain. Moreover, the Securities and Exchange Commission recently approved crowdfunding as a means of raising startup funds, so even small restaurants or food companies seeking this type of seed funding should consider if their sustainability story is compelling. Companies should provide concrete goals and performance metrics on sustainability, linking these efforts to financial performance where possible. There are numerous guidelines and organizations that can help companies with disclosure, such as the Sustainability Accounting Standards Board.

SCORE: 4

As social, environmental, and political uncertainty increase in the U.S. and in many countries that supply labor and goods to the food industry, investors seek businesses that incorporate sound sustainability strategies and risk management. Investors in publicly traded companies continue to demand that food and restaurant businesses disclose how they are meeting these challenges, and private equity investors seek innovative sustainability solutions, such as plant proteins that appeal to consumers.

IN SUMMARY:

- Just as there is a strong appetite for healthy, sustainable food (particularly among young people and Millennials), so there is an exceptionally strong market for investment products that focus on sustainability themes. These sustainable and responsible investment products now represent about one out of every five dollars invested in the U.S.

- Health and sustainability are now so widely recognized as important to the financial performance of food sector companies that even "conventional" investors ascribe a higher value to companies that incorporate sound sustainability strategies.

- Investors have doubled down on creating formal, standardized methods of benchmarking and valuing the sustainability performance of companies in the food space. These practices are integral to investor analysis and will continue despite significant regulatory changes made by the new administration.

VII. DEMOGRAPHICS AND CONSUMER PREFERENCES: ISSUES, TRENDS, AND CHANGING APPETITES

The issue briefs in this section highlight the ever-evolving role of chefs in shaping diners' palates and preferences, as well as the nuances and challenges of shifts to better food choices, ranging from less red meat to more appropriate portion sizes. New and existing research from psychology and related fields offers conceptual insights and empirical evidence in the ways that seemingly straightforward messages about food can be ineffective or even backfire. Chefs and foodservice providers can help dispel negative attitudes towards "healthy" and "low calorie" foods by making healthy food options delicious. Clearly, flavor is a powerful lever in shifting a wide range of consumer attitudes and behaviors. With regard to one shift in particular—that of moving toward more plant-forward eating patterns—chefs should not only consider and leverage the overall healthful halo of plant-forward menus (if actually healthful), but also gain a deeper understanding of the environmental burdens of producing their ingredients and the nutritional profiles of the various dishes they offer.

This section also covers the most important developments in the past year regarding local and regional food production—including the importance of long-term relationships between growers and restaurateurs and the more recent appreciation for local and regional meat—as well as where the greatest progress is being seen toward improved animal welfare.

CHEFS' INFLUENCE ON CONSUMER ATTITUDES

For the U.S. restaurant industry, 2016 was a year that saw innovative concepts and casual, eclectic menus emerge out of both a desire for fun and economic constraints, such as labor shortages and rising operating costs. Chefs also continue to migrate from "big pedigree" cities like New York and San Francisco to open restaurants in smaller, cheaper cities, resulting in vibrant micro food cultures throughout the country and an overall expanded appreciation for new foods and dishes that impact customers' attitudes nationwide.

After two years dominated by vegetable-focused menus, restaurants on the 2016 *Bon Appétit*'s Hot Ten and similar lists emphasized casualness, small and shareable plates, and wine lists highlighting lesser-known bottles. Vegetables being singled out less than they were in previous years indicates not a retreat to more meat-centric menus, but, as an informal survey of leading U.S. restaurants found, rather a "normalization" of more vegetable dishes fully belonging on acclaimed menus and as vehicles for culinary creativity. Innovative foodservice efforts, particularly among tech and lifestyle companies and in the college and university dining sector, have also further established the "pleasure" aspect of vegetables with plant-forward menus.

It remains to be seen whether more restaurants will follow establishments like The Perennial in San Francisco and consistently evaluate the environmental impact of their menus based on ingredients used. A recent survey of 369 studies of the "global warming potential" of 168 varieties of fresh foods confirms that vegetables, fruits, grains, and pulses make a smaller contribution to climate change than animal products. Another study suggests that in cold weather states, lettuce grown there off-season in unheated hoop houses has a lower carbon footprint than that of shipped-in lettuce grown outdoors in California. Chefs and operators who understand such differences have the opportunity to work with their suppliers on best practices for accessing locally grown produce year round, wherever they operate. As their grasp of sustainability issues continues to grow, we could see more frequent and/or nuanced messaging to diners around the environmental benefits of greater vegetable consumption.

In the fast casual sector, chef-driven concepts gained major ground in 2016. Those often featured more vegetables, whole grains, and healthy fats (such as olive oil, nuts, or avocados) on their menus than their fast food counterparts. Salads and grain bowls are two popular examples. In these cases, chefs should not only consider and leverage the overall, healthful halo of plant-forward menus (if actually healthful), but also gain a deeper understanding of the natural resource burdens of producing their ingredients and the nutritional profiles of the various dishes they offer. This two-pronged approach will appeal to more and more customers as time goes on, put operators on a more informed, secure footing in terms of preserving brand equity—and it is the right thing to do.

Restaurants and foodservice operations in all categories continue to make serious efforts to reduce food waste, using strategies that blend creativity and technical prowess with energy- and cost-saving measures. The Food Waste Reduction Alliance's fourth food waste assessment report noted "significant progress and investments." Measuring waste—and thus progress in reducing it—remains a challenge for many operators, however, and 49 percent of the survey's respondents did not possess data to report. Engaging their customers in that effort, including by making food waste reduction part of menu design, helps generate greater awareness of food waste at the consumer level.

Rising costs, from labor to ingredients, and increasing competition for skilled cooks has made for a challenging year that has seen several prominent independent chefs or restaurateurs needing to relocate or even close their restaurants, and others experimenting with various innovations in their business models, from wage structure to procurement strategies. Chefs from restaurants of Union Square Hospitality Group have begun bulk ordering, for example. Others have expanded into the cost-saving delivery-only sector, at times with Silicon Valley backing. A number of recent articles and editorials highlighting those issues, with owners being vocal about their challenges, may have helped increase customers' understanding of the relationship between operating costs, dining formats, and menu prices. However, much remains to be learned.

RECOMMENDATIONS:

For the greatest possible effect on consumer attitudes, chefs and operators should share as much information as possible with the public about what goes into their menu design and the foods they choose to serve. For example, a better understanding of operating costs—including the costs associated with addressing sustainability and health imperatives—might help consumers more readily accept some price increases (e.g., an assumption of those advancing organics and the "less meat, better meat" strategy). At the same time, consumers may gain greater appreciation for a chef's or operator's creative strategies when, beyond tasting good, dishes also contribute favorably to reduced food waste or greenhouse gas emissions. Because of chefs' direct access to consumers and ever-amplified platforms, whether in person, through social media, or on television, it is important that chefs educate themselves or at a minimum know where to direct others for information about a range of health, sustainability, business, and social issues. Only then will they be able to communicate accurately what drives their decision-making, from both creative and business perspectives. Toward that end, they can make use of resources provided by organizations such as The Culinary Institute of America, Chefs Collaborative, and The James Beard Foundation.

SCORE: 4

Overall, chefs and operators continue to increase their plant-forward offerings and reduce their portion sizes. It is important that they not think of vegetable-centric, plant-forward menus as trends, however, but as a new normal, in operations at all levels, in all markets.

IN SUMMARY:

- Operating costs and labor shortages are forcing chefs to be ever more creative with their business models and the style of dishes they put on their menus.
- As a result, innovation that advances imperatives around health, sustainability, and food ethics are taking place in concepts of all sorts, from food trucks and fast casual to university dining halls and fine dining.
- Vegetables and other plant-based foods are increasingly seen by chefs and operators, and as a result, by diners, as vehicles for creativity and pleasure, with healthfulness and sustainability as good bonuses. But chefs should not rely on the healthful halo of plant-forward menus for their future success, but rather should educate themselves on issues such as the carbon footprint and overall, actual healthfulness of the dishes they create.

CONSUMER ATTITUDES AND BEHAVIORS ABOUT HEALTHY AND SUSTAINABLE FOOD

Improving the diet of Americans depends in large part on the choices consumers make for themselves and their families. In last year's report, we saw that even consumers motivated to make healthier food choices can't help but be confused given the steady barrage of inconsistent advice about what is healthy. This year, we focus specifically on progress in consumer attitudes and behaviors about three critical categories of healthy and sustainable foods: red meat, foods labeled as healthy or low calorie, and organic foods.

Red Meat

Concerns about sustainability, environmental impact, humane treatment of animals, and personal health could each motivate consumers to reduce their consumption of red meat. While red meat consumption had dropped substantially since the 1980s and continues to drop modestly, many diners are still unwilling to change their diets. Recently, researchers at the University Institute of Lisbon designed a "meat attachment" scale that ranges from very low (e.g., revolted by the idea of eating meat) to very high (e.g., feeling that eating meat is one of the great pleasures in life). As expected, people's attachment to meat predicted how much they could be convinced to reduce their meat consumption. The authors concluded that using a one-size-fits-all strategy is mistaken when encouraging consumers to cut back on meat. Instead, they suggested, interventions should be tailored to people's beliefs, attitudes, and cultures. While some diners are motivated by concerns for their own health, others find animal welfare and environmental concerns more compelling. The authors further warn that some arguments about the benefits of reducing meat consumption could backfire among those who are strongly attached to meat, causing them to become defensive and strengthen their justifications for eating meat.

One new strategy for motivating consumers to reduce their meat consumption capitalized on people's well-known tendency to conform to normative behavior. The challenge here is that eating meat is normative, so emphasizing how many people eat meat would simply reinforce the idea of eating meat. But the researchers argued that people might also conform to dynamic, changing norms, so emphasizing how many people are trying to reduce their meat consumption might motivate someone to consider cutting back. To test this idea, the researchers presented study participants with one of two brief statements. One was a static norm, representing the current situation: "Recent research has shown that 30 percent of Americans make an effort to limit their meat consumption..." The other statement expressed a dynamic norm, representing an evolving situation: "Recent research has shown that…30 percent of Americans have now started to make an effort to limit their meat consumption..." Those who heard the dynamic norm reported being more interested in reducing their meat consumption. In a follow-up study, people in line to buy lunch at a university café were given one of the two statements as part of a survey they were asked to fill out. They were then given gift cards at the café for participating in the survey, and the cards enabled the researchers to track what each person ordered for lunch. People who learned that others were beginning to cut back on eating meat were more likely to themselves order a meatless lunch.

Foods Labeled as Healthy or Low Calorie

A number of initiatives have been undertaken to provide more information to consumers to help them make healthier food choices. Last year, the U.S. Food and Drug Administration (FDA) redesigned the format for presenting nutrition information on packaged foods. The key changes include: larger font and bold lettering for number of calories per serving and recalibrated serving size to reflect what people actually eat. Over the past year, restaurant chains and other large operations geared up for impending menu labeling requirements. Making calories so salient aims to help people make wiser food choices, under the assumption that calories are the most important thing to monitor in an overweight nation. A related initiative, providing calorie counts for dishes ordered at restaurants with more than a handful of similar dining operations, has been in place long enough to begin to assess its effect. So far, the results are not very encouraging. In a review of ten randomly controlled trials, the findings were mixed—some found benefits for women but not men; some found lower calorie options selected for side dishes but total calories were not reduced; some found lower calorie options selected for children but not parents; and fully half of the studies showed no benefit at all. The authors of the technical report of the 2015 Dietary Guidelines Advisory Committee suspected that, "the impact of menu labeling on calorie consumption is likely to be low." Follow-up studies will be essential for determining the impact of the FDA's calorie labeling efforts.

Beyond the potentially neutral effect of showing calorie information, there is reason to believe that labeling food as "low calorie" or "healthy" can even backfire. It is well established that many contextual cues affect the extent to which people find identical foods delicious or satisfying: Adults rate foods as more delicious if they are served at an elegant restaurant rather than a diner, for instance. Children rate carrots that they believe came from McDonald's as better tasting than ordinary carrots. Children rate the taste of "healthy" smoothies as worse than identical regular smoothies. Moreover, when people eat what they believe to be a low-calorie meal, they can feel less satisfied, become hungrier, and eat more at the next meal. Health psychologists have even documented that simply believing one has consumed a low-calorie milkshake instead of an "indulgent" milkshake heightens the secretion of the hormone ghrelin, which increases hunger.

Organic Foods

One example of clear progress in the move towards more sustainable choices among consumers is the increased consumption of organic foods. Not only is the increase substantial, but there is some evidence that interest in organic foods has begun to spread beyond the niche, upscale market. So far, this increase is more pronounced for consumers buying foods from grocery stores and less relevant for their selection of restaurants. Detailed evidence about consumers' motivations to buy organic produce is lacking, but avoiding pesticides, antibiotics, and other synthetic chemicals along with perceived health benefits are certainly important factors. The biggest obstacles to buying organic foods are expense and convenience, not consumer attitudes. Progress on those fronts could have a huge impact.

On the other hand, exaggerating the benefits of organic over conventional foods has its pitfalls. Some consumers forego eating fruits or vegetables when organic is not available. But it is far healthier to consume a variety of fresh or frozen conventional fruits and vegetables than it is to restrict consumption. Consumers can also be misled into believing because a food is organic it is healthy. But cookies or refined white bread, for example, are not healthy even when organic. Another concern is that in some cases conventional fertilizers can be safer than organic. When manure is used in organic farming, it can harbor E. coli, so if contaminated fresh vegetables are eaten raw, they can pose a health hazard.

RECOMMENDATIONS:

- Chefs and foodservice professionals can play an enormous role in helping to overcome resistance to foods characterized as "low calorie" or "healthy." Emphasizing and demonstrating how delicious more plant-based, healthy foods can be is one of the most effective ways of shifting consumers' perceptions.
- People are increasingly open to choosing more organic foods, so policies that can make these foods more affordable and accessible could be beneficial. Using messages about organic and sustainable production can help some diners make healthier choices.
- Evidence-based evaluations of how consumers react to labeling and new information are also essential. Some messages about food that seem benign can instead backfire, such as labeling healthy choices; we need evidence about how to avoid these unintended negative consequences.

SCORE: 3

Over the past year, there was mixed news about consumers' attitudes towards healthier and more sustainable food choices. Red meat consumption has shown modest declines among some consumers. Providing calorie counts in restaurants has shown mixed results. A bright spot, though, is the substantial and widening consumer interest in organic foods.

IN SUMMARY:

- There has been modest progress in consumers choosing healthy and sustainable foods, including a slight decline in red meat consumption and a mixed response to calorie counts in restaurants. Consumer interest in organic foods, however, has increased substantially.
- New and existing research from psychology and related fields offers conceptual insights and empirical evidence in the ways that seemingly straightforward messages about food can be ineffective or even backfire. Characterizing foods as "low calorie" or "healthy" can lead people to believe it is less delicious and less satisfying, and cause them to increase the amount they eat at subsequent meals. It is important to scientifically validate the effectiveness of health messages.
- Chefs and foodservice providers can help dispel negative attitudes towards "healthy" and "low calorie" foods by making healthy food options delicious. Clearly, flavor is a powerful lever in shifting a wide range of consumer attitudes and behaviors.

LOCAL FOOD AND FARM-TO-TABLE

The farm-to-table movement moved firmly into the mainstream in the early 2000s as chefs and others around the country strove to develop strong connections between restaurants and local farming communities. Consumers are now able to buy local and regional foods not only from restaurants, but also in farmers' markets or from their food retailers; furthermore, many have advocated the use of local foods in the burgeoning farm-to-school movement. Other local food trends include restaurant gardens, local sourcing of meat and produce, hyperlocal sourcing of greens, seasonal menus, and more recently, use of local foods in fast casual dining. A recent report to Congress from the U.S. Department of Agriculture indicates that the use of intermediated channels in regions with thriving local food systems (which includes farm-to-restaurant sales), helps farmers increase sales. Regional food hubs have an important role in the intermediated market channels, as these new businesses aim to provide an important link between sellers and buyers of local and regional food. A newly growing segment of this market is locally and regionally produced meats.

The bulk of research on the farm-to-table movement addresses benefits to consumers and farmers. Locally and regionally produced food can be fresher and tastier when it reaches consumers, with benefits extending beyond the consumer's palate, as purchasing food raised nearby supports local farms and can bring economic benefits to local communities. The relatively short shipping distances in local and regional markets allow farmers to produce high-value heritage and heirloom varieties of livestock and produce, whose quality is diminished when shipped over long distances. The market demand for heritage breeds is small but growing, and demand for some products, such as Thanksgiving heritage turkeys, appears so strong that some local purveyors sell out in advance.

Procuring locally and regionally produced food requires a significant amount of effort on the part of chefs and buyers, and places additional demands on local farmers and intermediaries. One challenge of using local food is that the supply chain differs from that used by conventional foods, requiring buyers and sellers to learn new ways of doing business. Research indicates that successful procurement of locally raised meat, as an example, depends on the creation of strong personal relationships that include close coordination and frequent communication between buyers and sellers along the supply chain. The quantity of local and regional meat supply is constrained by the capacity of processing facilities, which includes slaughtering, cutting, wrapping, and, in some cases, value-added processing. Small-scale meat processing facilities are costly to develop and require a steady flow of product for the facility to remain viable. Given the seasonality of meat production, that consistency is more likely to be achieved through coordinated efforts between buyers and sellers.

Restaurants face constraints on the supply of local food by the inherent seasonality of agricultural production. While farms in California are able to produce year round, for most of the nation there is little production for a portion of the year. As an example, a study of the farm-to-restaurant supply chain in Columbia County, New York, found that restaurants purchased from local farms for an average of 20 weeks per year. Meeting procurement needs is time-intensive and requires juggling multiple suppliers throughout the year, and may mean that local versions of some products, such as fresh fruits and vegetables, are available only during certain times of the year.

Upscale restaurants, such as Blue Hill at Stone Barns, have developed reputations for using local and regional meat. Yet local and regional foods, including meat, have joined the menus of restaurants of all types, including fast casual dining. Chipotle is one prominent example of a fast casual operation that sources ingredients from local and regional farmers, cultivating relationships with farmers to secure a steady supply of needed ingredients. Sysco, the foodservice supplier, ran a pilot project that developed strong ties with farmer-suppliers to increase the use of local food. Sweetgreen, a national salad purveyor, has a stated food ethos that includes transparency in the supply chain, which includes developing seasonal menus that allow the company to use local foods as much as possible, year round. Dig Inn, a recent entrant to the fast casual dining realm based in the Northeast, is bringing a new dimension by operating its own farm in upstate New York, making it vertically integrated. While specific data on the percent of locally sourced foods on the menus of these restaurants is not available, anecdotal evidence indicates that growth in farm-to-fast-casual dining has resulted in new relationships with local farmers.

Consistent restaurant purchases of locally and regionally produced ingredients can provide farmers with incentives to produce varieties suited to local agro-ecosystems, which often taste better. Our knowledge of the environmental and health benefits of local food systems is currently incomplete, yet research is ongoing on these important topics. (To learn more, please see the issue briefs on "Fruit and Vegetable Consumption and Production" and "Land Use and Natural Resource Conservation," on pages 36 and 39 respectively.) Furthermore, sustainable water practices may be easier to implement in a local food system, since local producers are likely to possess knowledge of issues pertinent to their local watershed. At the same time, it is encouraging that despite the fundamental challenges of the farm-to-table supply chain, restaurants and consumers continue to participate in the experience, because through their farm-to-table menus, restaurants may be able to raise awareness about the connections between agricultural production and fresh, delicious food.

As interest in local foods has grown, so has consumer awareness about animal welfare, antibiotic use in meat production, cages for laying hens, and other related farm practices. The extension from local sourcing to awareness and concern about animal welfare is a compelling example of how restaurants can contribute to greater supply chain transparency, which includes the procurement of meat satisfying certain animal welfare standards. On a small scale, these efforts appear to be a fundamental shift in the quality standards and production practices of the foods consumers demand. Hopefully, growing consumer demand for tasty, fresh, local, and regional food will encourage other restaurants, from upscale to fast casual, to expand their use of food from local and regional farmers.

RECOMMENDATIONS:

Consumer demand for locally and regionally produced meat continues to grow. Supply limitations can be addressed by close coordination between livestock farmers and local processors, to ensure profitability in the short term and the long term. To increase market supply, buyers should provide farmers with a consistent market for specialized products, and at good prices. Buyer commitment to farmers, in terms of both price and quantity, will reduce some of their risk of entering into new local and regional markets. Farmers need to commit to processors, as well, by ensuring the timing and quantity of a sufficient amount of livestock to the processing facility. The cultivation of these relationships stands to increase the supply of local and regional meat, even amid important national efforts to reduce overall meat production and consumption.

SCORE: 3.5

At long last, federal and local policies are supporting local and regional food. The combination of farmers, chefs (and other buyers), and local and regional food consumers in this new policy environment may be able to accelerate growth in the segment of the food system devoted to producing and consuming what many have termed "good food."

IN SUMMARY:

- Current farm-to-table trends include restaurant gardens, local sourcing of meat and produce, hyperlocal sourcing of greens, seasonal menus, and local foods appearing on the menus of fast casual dining establishments.
- Local and regional production can give consumers access to fresher, tastier foods, which may include heirloom varieties and heritage breeds that are unsuitable for mass distribution. It also contributes to economic sustainability by supporting local economies and increasing profit opportunities for participating businesses. By providing new and, hopefully stable, markets for farmers, chefs and fast casual restaurants can be leaders in this area.
- Procurement of locally and regionally produced food requires a significant amount of effort on the part of chefs, buyers, and farmers, particularly as there is an increase in demand for local and regional food. But it's encouraging that many restaurateurs feel it is worth cultivating long-term relationships with their nearby producers.

ANIMAL WELFARE

One hundred years ago the country and the planet had fewer people, eating less meat, in smaller portions. The demand for meat, dairy, and eggs was met by an agricultural system built of many more farms and ranches that were smaller than those that predominate livestock agriculture today. In many cases, though not all, this involved practicing traditional animal husbandry that involved cows grazing on open ranges, pigs rooting through underbrush and wallowing in mud, and chickens scratching through pastures for grubs and bugs. Times have changed—dramatically.

More people now inhabit the country and the planet, and they are eating more meat, in larger portions, more frequently. Americans eat more meat per capita than nearly any other country. In 2015, in the process of feeding about 320 million Americans, U.S. agriculture raised and slaughtered over 23 billion chickens, 115 million pigs, and 28 million cattle. The vast majority of animals raised for food in the United States live all or at least some portion of their lives in concentrated animal feeding operations (CAFOs). These CAFOs do not include open range, underbrush, or pastures. Instead, they employ gestation crates, battery cages, debeaking, tail docking, runt thumping, dehorning, castration, detoeing, maceration, and billions of animals living and sleeping in their own waste.

The decline in animal welfare is inversely proportional to increases in yield and efficiency. The use of hormones, antibiotics, and changes in feedstock have led cattle, pigs, and chickens to grow faster and bigger and to be slaughtered sooner. High yield and efficiency are achieved by packing thousands of livestock tightly together without the ability to engage in natural behaviors, such as grazing, rooting, or scratching for food. Feedstock, composed primarily of corn and soy, has to be produced in massive quantities and transported to the CAFOs. The cheapness of the animal protein produced in CAFOs leads people to eat more meat than is healthful. This high-yield practice is also inextricably linked to the degradation of soil, air, and water quality.

Small legislative steps have been made in a growing number of states to improve the welfare of farm animals. These include bans on: gestation crates that cage pregnant and nursing pigs so tightly they can't turn around, crates for veal calves, tail docking for cattle, and battery cages to house laying hens. As of 2016, Massachusetts became the 11th state to pass such legislation, in this case regarding gestation crates and veal crates. While that would appear to be a positive trend, Washington became the 10th state in this group back in 2011, five years ago, and so it appears the expansion rate to other states may have somewhat stalled. Also during the five-year span between 2011 and 2016, a New Jersey bill to ban gestation crates, which was backed by broad bipartisan support, was vetoed by the governor in 2014.

On the private sector side, several examples from the past year suggest that various animal welfare issues are now becoming more integrated into the food policies or philosophies of large food companies. Many of these examples involve the poultry industry, both broilers and layers. Panera Bread, as well as Compass Group, Aramark, Sodexo, Delaware North, and Centerplate have all committed by 2024 to: source all of their chicken from operations that use slower-growing strains of birds, reduce the stocking density of their flocks, provide enriched environments, process chickens using more humane standards, and demonstrate compliance with the above standards via third party auditing. Similarly, commitments for eggs to be sourced from 100 percent cage-free facilities are becoming widespread.

With regard to antibiotics, one of the issues is that excessive use in livestock appears to be leading to the growth of superbugs that are then resistant to antibiotics important in treating humans. (Please see the issue brief on page 43.) This excessive use is also tied directly to animal welfare. Most of the antibiotics used for livestock are given in food and water as a preventive measure to entire herds or flocks, rather than as treatment to individual animals that become sick. It turns out this strategy to use them preventively also leads to faster growth—excessively faster growth. Broiler chickens, in particular, can grow so fast that their legs become unable to support them. The greater weight leads to more profitability, but also to a life where normal movement is severely impaired.

More than half of the nation's largest restaurant and foodservice companies now have made commitments to reduce or eliminate antibiotic use in their supply chains. Despite this, the U.S. Food and Drug Administration found that antibiotic use increased in the past year (albeit at a slower rate), but the use of medically important antibiotics increased even faster. So closer monitoring and more effective efforts are needed to make sure suppliers are changing their practices.

As more and more food companies move to sourcing antibiotic-free animal products, they will simultaneously help to protect the effectiveness of antibiotic treatment options for humans, and increase the quality of life of animals.

RECOMMENDATIONS:

Foodservice and culinary professionals are responsible for a large proportion of the demand for meat, dairy, and eggs, and are in a position to promote profound improvements in the welfare of animals raised for food. Foodservice and culinary professionals can redesign menus to focus on smaller portions of meats, and dairy and eggs produced from better-raised animals. This can sometimes cost more, but could be offset by using smaller portions of the higher quality foods. A selective and informed approach to food sourcing and supply-chain management can help to promote more rapid change in the livestock industry and support and sustain producers using superior animal welfare practices (e.g., cage-free and antibiotic-free). Negotiations with producers may lead some to transition to improved animal welfare practices. But companies must regularly monitor the progress of their suppliers to ensure commitments are met. If successful, such efforts could make foodservice professionals a driving force in improving animal husbandry practices, supporting small farms and ranches, and improving the state of animal welfare in the meat, dairy, and egg sectors.

SCORE: 3.5

There is a growing awareness of the problems with animal welfare in the livestock industry. Some alternative practices are being employed by a small group of producers, and some legislative and policy initiatives have been passed. There remains substantial room for improvement, but in general there was more progress than there were setbacks over the past year.

IN SUMMARY:

- As yield and efficiency have increased in American agriculture, animal welfare has worsened.
- Encouragingly, animal welfare issues are now becoming more integrated into the food policies or philosophies of large food companies.
- The specific areas for which the greatest progress is being witnessed are the shift to cage-free eggs, bans on gestation crates for pigs, better conditions for broiler chickens, and greater demand for antibiotic-free meats.

VIII. NUTRITION, HEALTH, SUSTAINABILITY, AND FOOD ETHICS: SCIENCE AND POLICY HIGHLIGHTS

This section underscores how much is at stake in the call for innovative menu concepts and business models that shift eating patterns for the better: the overall health of humans and of the natural systems that sustain life on earth. Improvements toward healthier diets in the past year include a large reduction in trans fats, an important reduction in sugar-sweetened beverages, a modest reduction in red and processed meat, and small increases in whole fruits, whole grains, healthy fats, and nuts and legumes. Now that trans fat has been largely eliminated from the food supply, the leading dietary cause of chronic disease is highly processed carbohydrates—not just added sugar but also refined grains and white potato products like French fries. Foodservice operators can intensify efforts to enhance dietary quality and discourage consumption of sugar-sweetened beverages, as greater attention is need to the continued increase in adult obesity.

Although the U.S. foodservice industry is starting to think about low-carbon menu options, food safety concerns due to rising ambient temperatures further underscore the need for more substantial action and discussion about ways to reduce the industry's contribution to the climate problem. The industry is beginning to pay attention to water issues as drought and groundwater depletion weigh heavily on profits and as water scarcity is recognized as a high-priority global crisis. But foodservice leaders must move faster to address these two issues. High meat consumption, particularly red meat, has harmful effects on both human health and the environment. Over the past year, new studies added to existing evidence that shifts in eating habits toward more plant-based proteins, fruits, and vegetables can reduce the risk of certain chronic diseases, greenhouse gas emissions, and the burden on water and energy resources. Chefs are emphasizing new culinary strategies that make plants the stars on menus, and they can lead a cultural shift away from an overreliance on animal protein in the diet.

In addition, as noted in a new issue brief this year entitled "Land Use and Natural Resource Conservation," biodiversity preservation in the U.S. and abroad continues to be challenged by both food imports and the extent of land use for agriculture. However, dietary patterns that enable healthy Americans and production patterns that encourage natural resource preservation and restoration can be mutually compatible.

The following series of essays cuts through the complexity of nutrition and environmental science to provide clear guidance for culinary professionals. These issue briefs also suggest steps that foodservice operators can take not only to address current public health and environmental challenges, but also to provide leadership in the absence of improvements in public policy.

DIET AND HEALTH: RECENT TRENDS

The overall quality of the U.S. diet continued to improve modestly in the most recent years, extending a trend in steady improvement since 2000. This improvement proceeds along with a slow but modest increase in the share of food dollars the U.S. public spends on meals from the restaurant industry and a decline in grocery retail purchases that began several decades ago. Still, our overall dietary quality remains poor, and there is room for vast improvement, which will require different types of efforts from those tried in prior years.

By far, the greatest progress since 2000 was an approximately 80 percent reduction of trans fat, the single largest overall improvement in diet quality. With that change largely completed, the next greatest and more recent improvement was reduction in consumption of sugar-sweetened beverages, which decreased by about 25 percent, while we ate more fruit, whole grains, polyunsaturated fatty acids, and nuts and legumes.

The most recent data documented a continued modest decline in our consumption of red and processed meat, now at the lowest level in decades, contributing to improved diet quality and, importantly, in the ingredient category with the largest environmental footprint and contribution to climate change. The only dietary component that significantly worsened was sodium intake.

Each change in our dietary pattern affects our health, a connection studied intensively over the last several decades by researchers examining the relationships between what we eat and our health. In particular, they have looked at conditions such as cardiovascular disease, cancer, and total mortality. This has included experiments in animals; small controlled feeding studies in humans lasting for several weeks; large epidemiologic studies with decades of follow-up; and a limited number of randomized trials in humans. While these studies have been enlightening, the resulting tens of thousands of publications have, perhaps ironically, made it challenging for even a highly motivated consumer to interpret and synthesize this vast body of knowledge into useful guidance. Other documents have reviewed the literature and developed overall conclusions. But many of these reviews also have limitations as a result of gaps in the scientific literature (which remains a work in progress), the limited perspectives of some of the committees, and sometimes conflicts of interest.

One of the most influential review processes has been the Dietary Guidelines for Americans, which was most recently completed at the end of 2015. This process is intended to provide guidance to individuals, institutions, and federal policies related to food. Mandated by Congress, the United States Department of Agriculture (USDA), in conjunction with the Department of Health and Human Services, updates the Dietary Guidelines for Americans every five years. The USDA also created the Healthy Eating Index (HEI), a scoring system that can be used to rate the diets of individuals, or the menus of foodservice operations, based on adherence to its guidelines. In 1995, however, researchers at the Harvard T. H. Chan School of Public Health were concerned that the U.S. guidelines, which emphasized reductions of all types of fat, were inconsistent with the available scientific evidence.

They decided to use data on dietary intakes reported by over 100,000 men and women to determine whether those who adhered most closely to the federal guidelines had lower risks of cardiovascular disease, cancer, and other major chronic diseases, compared to those who adhered less well. Disappointingly, after accounting for tobacco use, physical activity, and other factors, there was little relation between adherence to the Dietary Guidelines and the risk of major chronic disease. Thus, these investigators developed the Alternate Healthy Eating Index (AHEI). Based on the best available published literature, it takes into account findings from short-term studies in humans on the effects of different diets on blood cholesterol fractions and other risk factors, as well as long-term prospective epidemiologic findings. Emphasis was given to findings about what we should be eating that were supported by both types of short- and long-term studies.

Using the same populations in which the USDA's HEI had been evaluated, the Harvard investigators documented that better adherence to their alternative index did predict lower risk of major chronic disease. During subsequent five-year updates, the U.S. Dietary Guidelines have evolved to be closer to Harvard's alternative index. Because scientific evidence has continued to accumulate, both the USDA HEI and the Harvard Alternate Healthy Eating Index have been updated and now both have predicted better health outcomes, although the AHEI 2010 did so somewhat more strongly.

In 2015, the USDA and HHS released the technical report of the 2015 Dietary Guidelines Advisory Committee, a group of senior scientists who serve without pay. Importantly, the Advisory Committee concluded that the upper limit on percentage of calories from total fat should be eliminated, and that the emphasis be on the type of fat, which is finally consistent with the Alternative Healthy Eating Index. For the first time, the committee explicitly recommended reduction of red and processed meats, for both health and environmental reasons. The limit on dietary cholesterol was also removed, in part because most of the U.S. population was already under the earlier limit of 300 mg/day, and large studies had not shown egg consumption to be related to risk of heart disease, except among people with diabetes. However, the committee did not actively promote egg consumption, and regarded eggs as approximately neutral. Notably, some foods such as nuts, whole grains, and plant oils can actually reduce blood cholesterol levels and risk of heart disease, and thus could be used to

create healthier breakfast options compared with eggs. Unfortunately, the final Dietary Guidelines for Americans, issued in early 2016, ignored key elements of the Advisory Committee report. Congress ordered the USDA not to include anything about environmental impacts of diet in the 2015 Dietary Guidelines. Also, the final Dietary Guidelines ignored the recommendations of the Advisory Committee to limit intake of red meat even for health reasons and explicitly to reduce consumption of sugar-sweetened beverages.

For the Menus of Change initiative, we have elected to use the elements of the Alternate Healthy Eating Index 2010 as the primary focus for evaluating healthfulness of diets. These have considerable overlap with the USDA's criteria but tend to be more intuitive and most directly supported by evidence. (For example, for political reasons the USDA has referred to added sugar and empty calories, while the AHEI refers to soda and other sugar-sweetened beverages; the USDA has referred to solid fat, while the AHEI refers to red meat as a source of unhealthy fat.) In addition, the USDA HEI does not specifically include trans fat.

Notably, the elements of the AHEI 2010 closely resemble those of the traditional Mediterranean diet, which has been associated with lower risks of many adverse health outcomes. This conclusion was reinforced by the results of a major randomized trial conducted in Spain. Compared to a group who were assigned to a low-fat diet, men and women assigned to a Mediterranean diet that emphasized healthy fats, such as olive oil and nuts, had a reduced risk of high blood pressure, diabetes, breast cancer, and total cardiovascular disease. In many respects, the Mediterranean diet serves as a gold standard for a healthy diet, but understanding the key elements of this diet allows its principles to be incorporated into the diets of many cultures and with different flavors.

DIVERGENCE OF SCIENCE FROM CONVENTIONAL BELIEFS

Conventional wisdom is often flawed, and the widely held beliefs about healthful eating are no exception. The Harvard Alternate Healthy Eating Index rates diets based on science that may not be familiar to everyone. Several topics in particular merit explanation because of their divergence from commonly held beliefs:

1. "Low fat" is not an appropriate diet goal. Low-fat diets were the rage in the 1980s and 1990s. But new, strong evidence has shown that the type of fat in the diet, rather than total fat, is strongly linked to heart disease. Moreover, low-fat diets are not effective for long-term weight control, as shown in a recent compilation of over 50 studies that lasted for one year or longer. Indeed, weight loss was actually modestly better on lower carbohydrate diets when the intensity of intervention was similar in both diet groups.

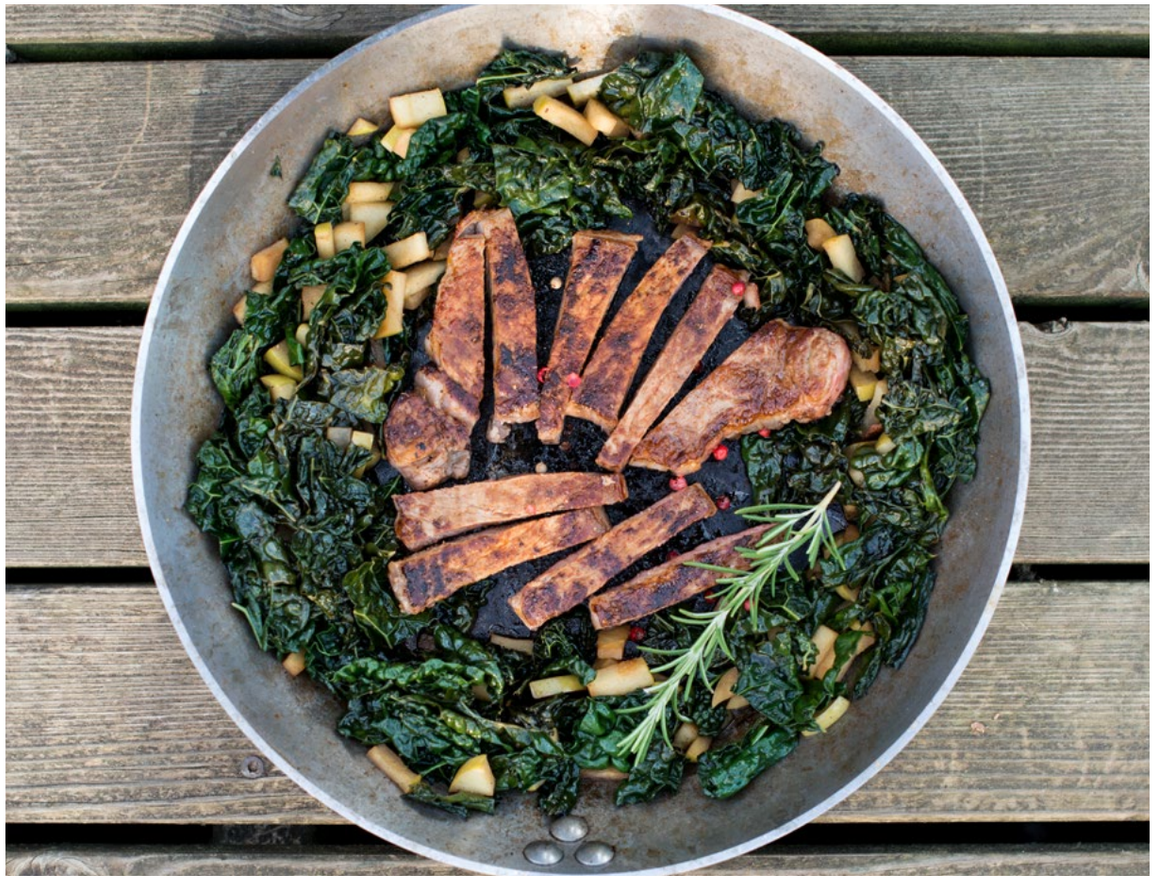
The type of fat is important. Trans fats from partially hydrogenated vegetable oils should be avoided, and unsaturated fats from vegetable oils should be used to replace saturated fat when possible. Saturated fat is similar to most carbohydrates in its relation to heart disease, so eating carbohydrates instead has no benefit, and it can be more harmful if those are refined starch or sugar. A 2014 meta-analysis (a statistical summary of published studies) printed in a prominent medical journal caused a wave of confusion by concluding that the type of dietary fat was unrelated to risk of heart disease, leading to a media storm epitomized by *The New York Times* article title, "Butter is Back." Unfortunately, the meta-analysis was deeply flawed in several ways. A recent and more complete summary of prospective studies refuted the 2014 meta-analysis and confirmed the benefit of replacing saturated fat with polyunsaturated fat, which mostly comes from plant oils, nuts, and seeds. As expected, eating refined carbohydrates instead of saturated fats didn't reduce the risk of heart disease. However, it is likely beneficial to replace saturated fat with whole-grain carbohydrates that are high in fiber and low in glycemic index. Not surprisingly, a recent analysis confirmed that replacing dairy fat with unsaturated plant oils was associated with a substantially lower risk of heart disease among American adults.

In a major analysis including 200,000 men and women with up to 30 years of follow-up, having a diet with a higher percentage of calories from fat was related to lower overall mortality, in part because of recent changes in the types of fats we eat, including a reduction in trans fats and increases in healthy plant-based fats. Again, the type of fat was very important for avoiding deaths due to cardiovascular disease as well as other conditions.

2. Reducing red meat is the answer, not just eating lean cuts. Reducing saturated fat is not beneficial if replaced by carbohydrates, but replacement by unsaturated fats will have multiple health benefits. Therefore, simply reducing the fat content of red meat likely will have minimal benefits because it is often replaced by calories in the form of refined starches, potatoes, and sugar. Moreover, other evidence suggests that reducing intake of red meat, irrespective of its total fat content, will decrease risks of heart disease, stroke, and type 2 diabetes, if replacing the red meat with poultry, fish, nuts, soy, or other legumes.

3. Contamination and environmental risks need to be minimized, but these should not deter consumption of seafood from a health perspective. An earlier report that fish, specifically farmed salmon, had been contaminated by industrial chemicals triggered a widespread scare that led many people to reduce their consumption of fish. But there was no evidence that the amounts of the chemicals found were enough to cause human disease. Also, the very small risk derived from theoretical calculations is substantially outweighed by the clear benefits of eating seafood. Some species of fish, such as swordfish, tilefish, and tuna, do contain mercury, mainly from natural sources; these fish should not be consumed by pregnant or lactating women. However, it is extremely important that pregnant women do eat fish in general, because a generous intake of omega-3 fatty acids is needed for neurological development of the fetus.

Overfishing and damaging forms of aquaculture are also serious issues. But the worries generally concern a handful of popular commercial species such as tuna, cod, salmon, and shrimp, and these species are being caught or farmed sustainably in some places. Eating a wider variety of fish species, both wild and farmed, is one simple measure that can contribute towards maintaining a healthy diet and addressing environmental concerns. In particular, both health and environmental impacts will be improved by consuming more small, oily fish like anchovies, sardines, and herrings. Given that further increases in fish consumption will need to come primarily from aquaculture, research on aquaculture methods to enhance the already efficient conversion of feed to fish, and to reduce the environmental footprint, will be a sound investment.



INDICATORS OF DIETARY QUALITY AND RATIONALE FOR THE AHEI

The elements of the Alternate Healthy Eating Index 2010 are described below, each with a brief scientific rationale. The scientific literature on each of these is large, and a more extensive discussion of these topics is beyond the scope of this report. The indicators are discussed in more detail and with additional references on the Harvard T.H. Chan School of Public Health website, Nutrition Source (nutritionsource.org).

Vegetables: Vegetable consumption has been associated with lower risk of cardiovascular disease, in part because vegetables are a major source of potassium, which reduces blood pressure, but other components may also contribute to this lower risk. The relation between vegetable consumption and cancer risk is much weaker than previously believed, but some modest benefit is likely for specific forms of cancer. Potatoes (including baked, mashed, and French fries) are not included as a vegetable because they are a major source of starch, have not been associated with lower risk of chronic disease in epidemiologic studies, and are associated with increased risk of weight gain and diabetes. Nutritional considerations took a step backward when members of Congress inserted a clause in the 2014 budget agreement that the Women, Infants, and Children (WIC) program should consider potatoes a vegetable, as they had previously done to the USDA school health standards. Corn has also been associated with weight gain and should be considered as a starch rather than a healthy vegetable.

Whole Fruits: Fruit consumption has been associated with lower risk of cardiovascular disease and diabetes. The AHEI included only whole fruit in its definition. Fruit juice, which is high in rapidly absorbed sugar, is not associated with lower risk of cardiovascular disease or cancer, and is associated with weight gain and risk of diabetes. Until recently, fruits have been considered a homogenous food group, even though they differ greatly in composition, and thus potentially health effects. In a detailed 2013 analysis, specific fruits differed greatly in relation to future risk of diabetes. Although most fruits were associated with lower risk, the regular consumption of blueberries was associated with the lowest risk. Eating plenty of fruits and vegetables is desirable, but additional analyses of specific fruits and vegetables are needed to provide more precise recommendations.

Whole Grains: Greater consumption of whole grains is associated with lower risk of obesity, cardiovascular disease, diabetes, and possibly colorectal cancer, and overall mortality. Conversely, refined grains are not associated with lower risk, and may increase risk of diabetes, coronary heart disease, and other chronic diseases. In calculating intake of whole grains, the AHEI uses grams of whole grains, which accounts for the variability of the percent of grains that are whole in a range of "whole-grain" products. (This variability is because the U.S. Food and Drug Administration (FDA) allows the description of "whole grain" if a product is 51 percent or more whole grain.)

Nuts and Legumes: Nuts, legumes, and soy products are valuable sources of protein and contain important constituents such as unsaturated fat, fiber, copper, magnesium, plant sterols, and other nutrients. Nuts and other vegetable proteins have been associated with lower risk of cardiovascular disease and overall mortality, especially when used as a substitute for red meat. Nuts are also associated with lower risk of diabetes and of weight gain.

Fish (EPA + DHA): Two or more servings of fish per week, including species high in long-chain (n-3) fatty acids EPA + DHA, are strongly protective against fatal cardiac arrhythmias and sudden cardiac death. This also may lower the incidence of other cardiovascular diseases.

Polyunsaturated Fat: Replacing saturated fats with polyunsaturated fats improves blood cholesterol fractions, is associated with a lower risk of coronary heart disease, and may lower risk of type 2 diabetes. In contrast, a low-fat diet has had little beneficial effects on blood lipid levels or blood pressure, and has not reduced the risk of cardiovascular disease, breast cancer, colon cancer, or total mortality. One popular belief is that n-6 fatty acids, the large majority of polyunsaturated fat in the U.S. diet, increase inflammation, cardiovascular disease, and other conditions, and that the ratio of n-6 to n-3 fatty acids is critical. This hypothesis has been consistently refuted in many studies. Indeed, the doubling of intake of n-6 fatty acids over the last 50 years almost certainly accounts for a large part of the major reduction of cardiovascular mortality in the U.S. during this time. Both n-3 and n-6 fatty acids are essential, and we need adequate amounts of each of these; the ratio is irrelevant.

Monounsaturated fats also have beneficial effects on blood lipids. In practice, replacing saturated fats with polyunsaturated and monounsaturated fats means using liquid vegetable oils instead of butter, lard, partially hydrogenated fats, or tropical oils (e.g. palm, palm kernel, and coconut oils) wherever possible. Moderate use of coconut oil when the special flavor is important is reasonable, but is best not used as a basic cooking fat.

Trans Fats: Trans-isomers of fatty acids, formed by partial hydrogenation of vegetable oils to produce margarines and vegetable shortening, are associated with higher risk of coronary heart disease, diabetes, and weight gain. Fortunately, use of these has been greatly reduced, and we have now seen benefits in the form of improved blood cholesterol fractions in national surveys of both children and adults. Accelerated declines in the risk of heart disease have been seen in cities that banned trans fats in restaurants and in Denmark, which banned trans fats nationwide. In late 2015, the FDA announced that partially hydrogenated fats would no longer be considered Generally Recognized As Safe (GRAS) and must be removed from the food supply by 2018, thus eliminating industrial trans fat in the U.S.

Red and Processed Meat: Consumption of red meat and processed meat is associated with greater risk of coronary heart disease, especially when substituted for nuts, poultry, or fish. Red meat and/or processed meats are also associated with higher risk of stroke, diabetes, and colorectal and other cancers, and total mortality. A recent report provides evidence that similar replacements for red meat during adolescence will reduce a woman's future risk of breast cancer. A 2015 review by the World Health Organization (WHO) confirmed the association with colorectal cancer.

The greater risks of cardiovascular disease are mediated in part by the higher amounts of saturated fat and cholesterol in red meat, but other factors are also likely to play a role.

Environmental assessments lead to similar conclusions about protein choices: Selecting better types of red meat or eating "nose to tail" are not a sufficient solution because red meats have an outsized impact on the land, water, and climate compared to poultry, fish, and plant-based proteins such as soy, beans, and nuts. Figure 1 (page 29) illustrates the greenhouse gas emissions associated with several common protein sources and is a good indicator of environmental impact including energy and chemical use, soil management, and mechanical irrigation. Both public health and the environment will improve if restaurants decrease the amount of red meat on menus and replace it with alternative protein sources and/or other healthful ingredients.

Sugar-Sweetened Beverages: Intake of sugar-sweetened beverages, including soda and fruit drinks, is associated with increased risk of weight gain and obesity, cardiovascular disease, diabetes, and gout. The AHEI included intake of fruit juice in this category, given the positive association with risk of diabetes, and the lack of beneficial effects on cardiovascular disease or cancer, which has been seen from consuming whole fruits. The large amounts of sugar added to other foods, in addition to beverages, are also likely to have adverse health effects, but these effects have been less well documented.

Sodium: High sodium intake increases blood pressure, and salt-preserved foods are associated with greater risk of stomach cancer, cardiovascular disease, and total mortality. Lower-sodium diets significantly reduce blood pressure and cardiovascular disease in clinical trials. Reductions in sodium intake to 2,300 milligrams per day, as recommended by the Dietary Guidelines, would prevent many new cases of cardiovascular disease. Although further reduction to 1,500 milligrams per day does reduce blood pressure, intakes this low have not been studied directly in relation to risk of cardiovascular disease, and such a study would be difficult to conduct. Because hypertension is a strong risk factor for cardiovascular disease, the American Heart Association and other groups have recommended that the large parts of the U.S. population who are at higher risk of hypertension aim for 1,500 milligrams per day. Controversy has recently emerged about whether the goal for sodium reduction should be 2,300 or 1,500 milligrams per day. This controversy has little practical impact because average intake in the U.S. is about 3,500 mg per day, so even getting close to 2,300 mg per day, or one teaspoon, is a challenge.

RELATIVE GREENHOUSE-GAS EMISSIONS ASSOCIATED WITH SOME COMMON PROTEIN SOURCES

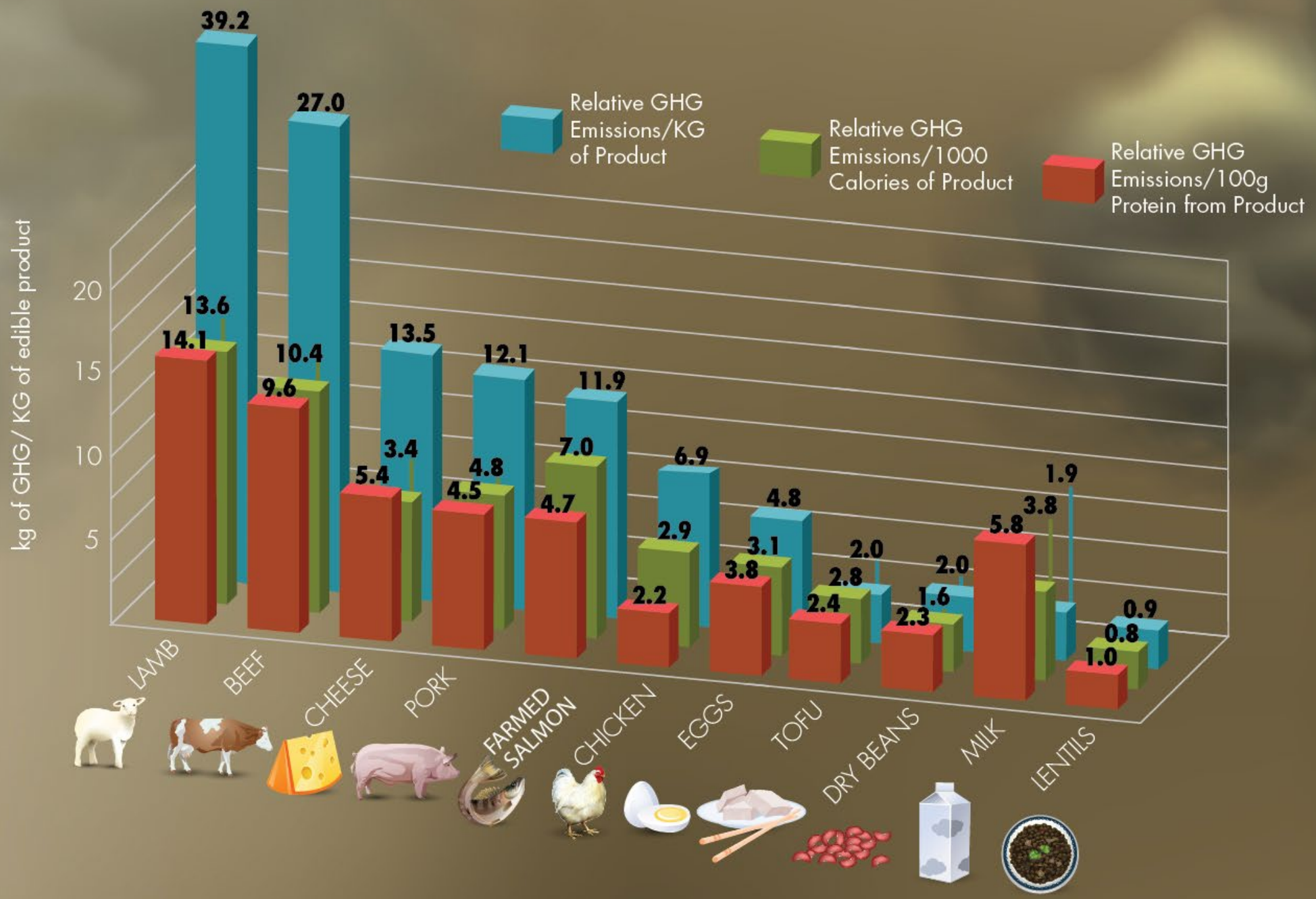


Figure 1 illustrates the greenhouse-gas emissions associated with several common protein sources and is a good indicator of environmental impact including energy and chemical use, soil management, and mechanical irrigation. Both public health and the environment will improve if restaurants decrease the amount of red meat on menus and replace it with alternative protein sources.

***Calorie Reference:** USDA National Nutrient Database for Standard Reference, Release 25: Energy (kcal) Content of Selected Foods per Common Measures, https://www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a208.pdf
****Protein Reference:** USDA National Nutrient Database for Standard Reference, Release 25: Energy (kcal) Content of Selected Foods per Common Measures, https://www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a203.pdf

2015 DIETARY GUIDELINES FOR AMERICANS: WHICH REPORT TO FOLLOW?

The 2015 Dietary Guidelines for Americans (DGAs) are an improvement in some important ways over the previous (2010) version, especially with the removal of the restriction on percentage of calories from total fat, the new limit for added sugar, and a shift in focus to healthy dietary patterns (versus just nutrients). Unfortunately, Congress censored the DGAs scientific advisory committee's conclusion that red meat consumption should be reduced for reasons of planetary health; this *was* within the scope of the committee because it is not possible to have food security if our food supply is not sustainable. However, the USDA went further and also largely ignored its own scientific advisory committee's conclusion that consumption of red and processed meat should be reduced for health reasons. In addition, the clear scientific conclusion that sugar-sweetened beverages should be singled out for reduction was eliminated in the final recommendations. Though the final DGAs are the official reference point for various governmental directives that cascade from them (e.g., U.S. government–funded feeding programs), chefs, food business leaders, food and health reporters, and the general public should focus instead on the earlier report of the 2015 Dietary Guidelines for Americans scientific advisory committee as the far better dietary guidance document based on the current state of scientific evidence.

—Walter Willett, MD, DrPH, Past Chairman, Department of Nutrition, Harvard T.H. Chan School of Public Health

DIETARY FACTORS NOT INCLUDED AS INDICATORS

1) Alcoholic Beverages: Strong evidence indicates that moderate consumption of alcoholic beverages reduces risk of heart disease and diabetes. However, even at these moderate levels, risk of breast cancer is increased, and alcohol consumption increases risk of traffic injuries and abuse. Because of these competing risks and benefits, which depend in part on age and family history of alcohol dependence, this topic was deemed too complex to be useful as an indicator of diet quality for an overall population.

2) Coffee and Tea: The health effects of these beverages have been studied extensively, and they are safe and good alternatives for sugar-sweetened beverages. Some health benefits have been seen for coffee, including reductions in risk of diabetes and premature death. But because caffeinated coffee intake is often limited by effects on sleep due to caffeine, and tea seems to be neutral with respect to health, they were not included as indicators. Notably, the apparent benefits for diabetes and premature death are also seen for decaffeinated coffee, suggesting that factors other than caffeine are responsible for these favorable outcomes.

3) Milk, Cheese, and Other Dairy Products: Milk is widely promoted as essential for adequate calcium intake and bone health. However, the basis for the calcium requirements in the U.S. is dubious—they are much higher than the WHO's definition of adequate intake—and recent studies do not show a reduction in bone fractures with high dairy consumption by either adolescents or adults. Also, high consumption of dairy products puts large amounts of unhealthy fat into the food supply. For these reasons, greater consumption has not been included as an indication of higher dietary quality. Although there is not sufficient reason to promote higher consumption of dairy products for health reasons, moderate consumption of one or two servings a day can add variety and flavor to diets and may contribute to diet quality, depending on other aspects of a person's diet. Plant-based dairy substitutes, such as soy or almond milk, are reasonable alternatives to cow's milk for those who want to consume that kind of liquid. However, many of these substitutes are high in added sugar and should be consumed in limited amounts.

Consumption of cheese has been increasing dramatically over the last several decades in the U.S., becoming almost de rigueur in salads and sandwiches. Cheese provides large amounts of sodium along with less healthy fats and many calories. Consuming smaller amounts of cheese and the use of alternative ways to add flavor and variety to these foods, such as using nuts, are desirable. Recent data suggest that consumption of yogurt may be associated with lower likelihood of weight gain and diabetes, and this deserves further investigation. Of particular concern are the large amounts of sugar added to milk and many yogurts. Minimizing added sugar and using the natural flavor of yogurt to advantage should be a goal.

TIME TRENDS IN KEY DIETARY INDICATORS

To judge whether American diets are becoming more healthful for this report, investigators from Harvard T.H. Chan School of Public Health have applied the standards established in the Alternate Healthy Eating Index to national survey data for the U.S. Each variable is scored from 0 to 10, with 10 being the healthiest. Thus, for polyunsaturated fat, whole fruits, vegetables, whole grains, nuts, and legumes, a higher score means higher intake.

For trans fat, sugar-sweetened beverages and fruit juice, red and processed meat, and sodium, a higher score means lower intake. The total score is the sum of the individual elements; 100 would be perfect. For the 2017 report, we used data for persons 20 years of age and older from 1999 through 2012, the latest available data from the U.S. National Health and Nutrition Examination Survey (NHANES), which is a representative national sample of the U.S. population. Complex foods, such as a soup or stew, were dissected so the individual components were included as red meat, vegetables, etc. Intake of trans fat is not available from the NHANES, so FDA data were used to estimate the national trend.

Encouragingly, the overall quality of the U.S. diet has improved steadily since 2000 and since our last report based on data up to 2010. However, the overall score remains poor, and there is room for vast improvement. (The average score remained below 50 out of 100 possible points.) By far, the

greatest progress since 2000 was in reduction of trans fat, estimated to be about 80 percent, which accounted for about half of the overall improvement in diet quality. The next greatest improvement was reduction in consumption of sugar-sweetened beverages, which decreased by about 25 percent. Modest increases were also seen for fruit, whole grains, polyunsaturated fatty acids, and nuts and legumes. A modest reduction continued in the consumption of red and processed meat, contributing to improved diet quality. The only dietary component that significantly worsened was sodium intake.

Using data relating AHEI scores to health outcomes in two large Harvard cohorts, it was estimated that the improvements in dietary quality from 2000 to 2012 prevented 1.1 million premature deaths and resulted in 8.6 percent fewer cardiovascular disease cases, 1.3 percent fewer cancer cases, and 12.6 percent fewer type 2 diabetes cases. Consistent with these estimates, in late 2015, the Centers for Disease Control and Prevention (CDC) reported that diabetes incidence rates had decreased by about 20 percent in the U.S., which is remarkable because this appears to be the first time a country has even slightly bent the curve in the diabetes epidemic. Because intakes of trans fat and sugar-sweetened beverages are both clearly related to risk of type 2 diabetes, the important reductions in these dietary components are likely key explanatory factors in the decrease in diabetes incidence.

The improvements in diet quality were not shared across groups defined by income and education; among the lowest socio-economic groups there was little improvement. This is troublesome because the AHEI score is based on prediction of morbidity and mortality, so disparities in health are likely to increase. It is noteworthy that the NHANES data were available only through 2012 due to delays in processing, and do not include the effects of many public health promotion campaigns and changes in foodservice operations since that time, which have been designed to increase consumption of fresh fruits and vegetables and whole grains, while reducing intake of red meat. Improving dietary quality has become a bigger part of the national conversation that hopefully will lead to more rapid improvements.

In the U.S., the prevalence of obesity in children has plateaued over the last several years, although at a level three to four times higher than in the early 1970's. In some parts of the country where intensive efforts have been made, such as New York City, decreases have been seen. Unfortunately, the prevalence of obesity has continued to increase among adults.

SCORE: 3

Improvements toward healthier diets include a large reduction in trans fats, an important reduction in sugar-sweetened beverages, a modest reduction in red and processed meat, and small increases in whole fruits, whole grains, healthy fats, and nuts and legumes. The continued increase in adult obesity is alarming, however, and is the reason for dropping the score to 3.0 from 3.5 last year.

IN SUMMARY:

- Progress is visible, including the FDA's action to eradicate trans fat from the food supply, an important reduction in the consumption of sugar-sweetened beverages, and a small increase in how much whole fruits, whole grains, legumes and nuts Americans consume. However, the trend toward higher sodium intake is troublesome and highlights a need for foodservice operators to address this issue more directly.

- The continued increase in adult obesity needs greater attention. Foodservice operators can intensify efforts to enhance dietary quality and discourage consumption of sugar-sweetened beverages.

- Reduction of greenhouse gas production and climate change is urgent. Replacing red meat with other protein sources is essential, and every step in the food chain should be optimized for planetary health.

PORTION SIZE AND CALORIC INTAKE

It seems to make so much sense. If you want to lose weight, simply "eat less, and move more." This advice has been proffered by government, by professional societies, and at the doctor's office. Yet an astoundingly small proportion of people with excessive weight (more than two thirds of the U.S. adult population) can maintain significant weight loss over the long term.

The conventional explanation for this failure is a combination of low willpower and our "toxic environment." Surrounded by inexpensive, high-calorie foods ubiquitously available in large portion sizes, many people are unable to exert self-control, persistently overeat, and gain weight.

Without doubt, the portions Americans eat have increased dramatically in the last half-century. Restaurant portions ballooned to lure in "value" customers, and the rate of new, larger portion-size introductions among a sample of common commercial products increased by more than a factor of 10 from 1970 to 1999. Indeed, research consistently shows that most people eat more when offered larger portions of tasty food, over the short term.

For this reason, a major focus of public health in obesity prevention has been reducing and redefining portion size, as exemplified by the "100 calorie pack."

But these measures disregard a fundamental scientific fact demonstrated repeatedly in the research laboratory: Body weight is determined more by biology than willpower over the long term.

When people cut back on calories, they will initially lose weight. But the body fights back, with rising hunger and slowing metabolism. This effect was dramatically illustrated in a recent and much-publicized follow-up of contestants on the show "The Biggest Loser." Despite participants' exceptional motivation (and the intensive support they received), virtually all described a constant struggle with their bodies and weight regain over time.
Certainly, genetic make-up helps to explain individual differences in predisposition to obesity. But our genes haven't changed in recent decades, as obesity prevalence has skyrocketed. What has changed beyond calorie abundance, is the quality of the food supply brought about largely by the obsessive focus on reducing fat in the diet.

During the low-fat craze of the last 40 years, the American public was told to eat all fats sparingly and instead fill up on carbohydrates. Responding to this call, the packaged foods industry marketed tens of thousands of reformulated food products that substituted fat with refined starches and added sugars. Unfortunately, these highly processed carbohydrates have exceptionally low satiety value. (Please see sidebar below.)

Processed carbohydrates typically raise blood sugar more than any other food, calorie for calorie (i.e., they are "high glycemic load"). High blood sugar levels in turn cause the body to secrete large amounts of insulin, a hormone that programs the body for calorie storage. States of high insulin secretion are characteristically associated with weight gain (e.g., excessive insulin treatment in type 2 diabetes), whereas inadequate insulin causes weight loss (e.g., under treatment in type 1 diabetes).

The 2015 Dietary Guidelines Advisory Committee found that fat in the diet, despite its high calorie content, is not uniquely fattening and that some high-fat foods are highly health protective. Instead, increased focus on the type and amount of carbohydrates is needed.

A strong case can be made that increasing the portion size of refined starchy foods (e.g., extruded breakfast cereals, bread, white rice, pasta, fries) and added sugars (e.g., sugar-sweetened beverages, highly sweetened desserts) erodes diet quality and leads to obesity and chronic disease. Conversely, increasing the portion size and serving frequency of minimally processed carbohydrates (vegetables, fruits, legumes) and healthful fats (nuts, avocados, oil-based salad dressings), will displace less healthful foods, improve diet quality, and protect against chronic disease. In addition, high-quality plant-based proteins (nuts, legumes, soy products) and seafood have a special role in promoting satiety and balancing the metabolic effects of carbohydrate.

All calories are not alike. The belief that they are has produced misguided attempts to modify the food supply and led to confusion about what to do within the culinary profession and the foodservice industry. Simply lowering the total calories in a meal by reducing fat content will not produce benefit, if that meal is less satisfying and leads to subsequent overeating.

In this context, recent initiatives for nationwide calorie labeling should be viewed as only part of the solution. It's important to ensure attention is paid to diet quality, not merely quantity.

RECOMMENDATIONS:

Culinary professionals have an unprecedented opportunity to help end the epidemics of obesity and related diseases. However, a paradigm shift is needed. Measures that only reduce calories, without enhancing the quality of those calories, are destined to fail. Instead, the focus should be on serving more minimally processed carbohydrates, healthful fats, and healthful proteins—and serving them in ever-more delicious, creative, and appealing ways—while simultaneously reducing carbohydrates with high glycemic load including refined grain products, white potato, and added sugars. The goal is to make healthy foods the most appealing options. These changes will require simultaneous restructuring in national food policy, to increase the amount of these products in the food supply, and to lower their cost relative to commodities.

SCORE: 3

Efforts to improve diet quality continue to move in a positive direction: away from the low-fat paradigm and a single-minded focus on calorie reduction. The public seems to have reached a turning point, with demand for commodity-based industrial food products in decline and interest in whole/minimally processed foods rising in both retail and restaurants. Thus, though some progress has been made, a more fundamental focus on food quality and calorie quality, not *only* quantity, is still needed.

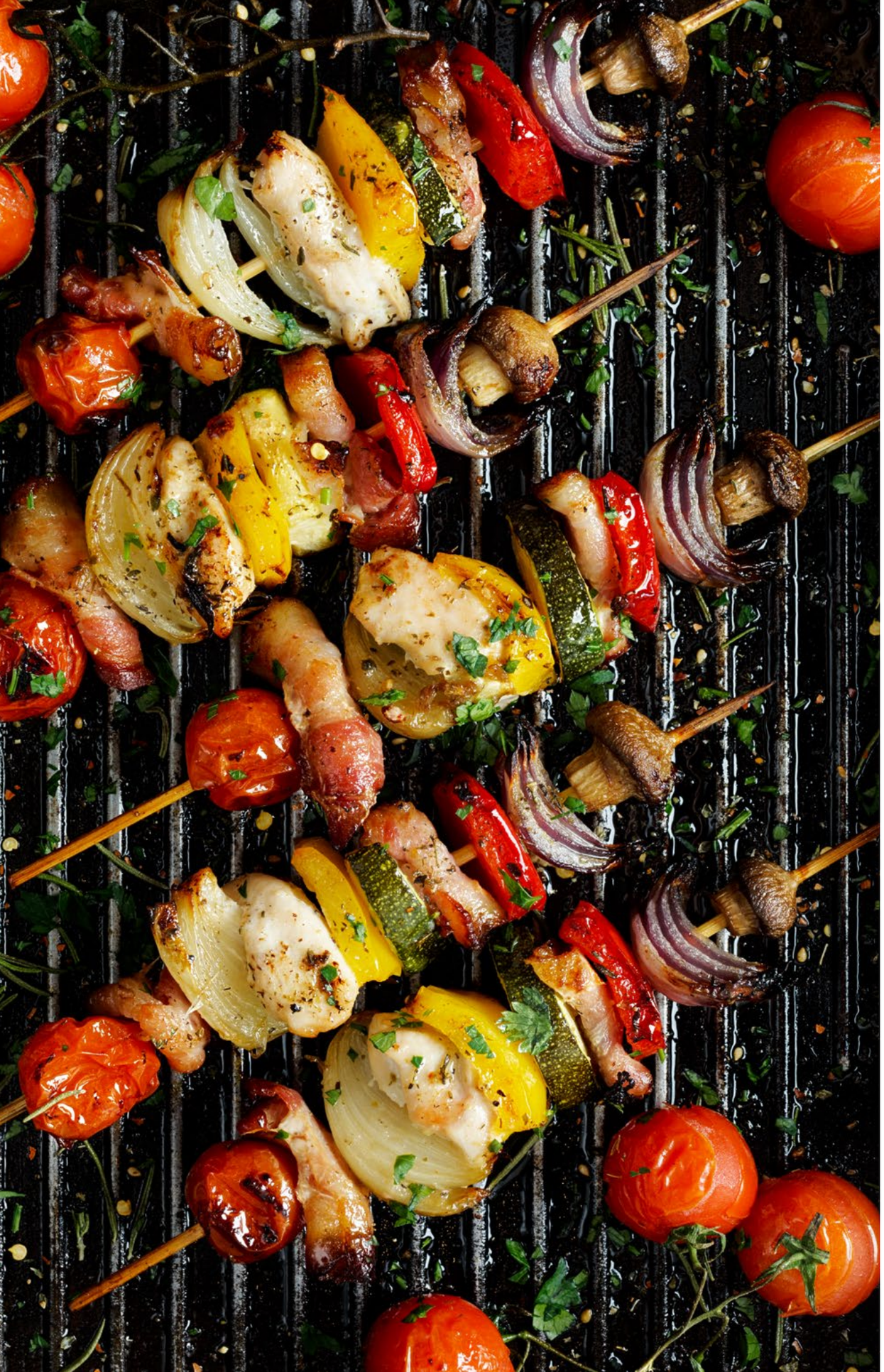
IN SUMMARY:

- All calories are not alike, so it is critical to complement the current focus on portion size with a shift in our cultural thinking on diet quality.
- Now that trans fat has been largely eliminated from the food supply, the leading dietary cause of chronic disease is highly processed carbohydrates—not just added sugar but also refined grains and white potato products like fries.
- To increase consumption of minimally processed carbohydrates, healthful fats, and high-quality proteins, changes in national policy that focus on decreasing prices of these foods relative to commodities are needed. Culinary strategies are also needed from the foodservice industry to make these options more available on menus and served in a variety of delicious ways.

IN A WORD: SATIETY

According to the "energy balance" view of weight control, an eight-ounce sugary soda at 100 calories would be better for your weight than a one-ounce serving of nuts at almost 200 calories. Of course, common sense and definitive research say that's not so. The sugary beverage might give you a quick rush of energy, but it will leave you hungry again and prone to overeating soon. In contrast, the nuts will elicit strong satiety – that long-lasting sense of fullness after eating. Even though fat has about twice the calories per gram of carbohydrate, high-fat foods typically produce greater *satiety per calorie* than processed carbohydrates. Some of the most calorie-dense foods in existence (e.g., nuts, olive oil, dark chocolate) are consistently associated with lower body weight than refined grains, potato products, and concentrated sugars. They are also demonstrably healthier for the heart.

All calories are *not* alike to the body. Often repeated phrases in the public health community and media such as "balance energy intake with energy expenditure" and "there are no bad foods" do not reflect current science. These arguments distract us from focusing on the paramount importance of *diet quality* as a key determinant of long-term caloric intake and metabolic health for each of us individually—and ultimately as a key determinant of many of the largest food, health, and environmental challenges for all of us collectively.



PROTEIN CONSUMPTION AND PRODUCTION

The average American over age 20 consumes between 48 and 76 percent more protein than is recommended, for women and men respectively. Animal sources account for approximately two thirds of this dietary protein. Yet, plants such as nuts, seeds, beans, peas, legumes, grains, and cereals are also important sources of protein. The amount and types of protein consumed can have significant effects on the environment and the risk of chronic diseases and premature death. Culinary and foodservice professionals have an important role to play in leading and inspiring a balance of protein sources on Americans' plates that is healthier for both people and planet.

This past year, red meat consumption in the U.S. continued to decline modestly with beef consumption in the U.S. now at the lowest level in over two decades. This is a departure from global trends. Over the past several decades, meat production and consumption have increased sharply worldwide, especially in developing countries. Global demand for livestock products is projected to increase 70 percent by 2050, driven by population growth and rising affluence. In the U.S., total meat consumption (red meat plus poultry) still remains high, 57.1 kg per capita in 2013, the fifth highest consumption rate globally, although it is important to distinguish between red meat, fish and seafood, and poultry in both environmental and dietary guidance.

Animal-based foods contribute disproportionately to the total environmental costs of food production. The livestock sector is responsible for over 14 percent of all human-induced greenhouse gas emissions (GHGE), nearly a tenth of global human water use, and 63 percent of reactive nitrogen mobilization. The main reasons for these impacts are enteric emissions from ruminant animals such as beef and milk cows, emissions to air and water from manure management, and the production of animal feed. Thirty-nine percent of the corn crop, which uses more land than any other crop in the U.S., goes to feeding livestock, with the remaining 31 percent to make fuel ethanol, 13 percent to exports, and six percent to produce high-fructose corn syrup and other sweeteners. (Please see Figure 2 on page 35). Feed conversion efficiencies of raising livestock vary greatly by species: By one estimate, it takes 36 calories of feed to produce one consumed calorie of beef. This ratio is 11:1 for pork, 9:1 for poultry meat, and about 6:1 for eggs and dairy. (Please see Figure 1 on page 29.)

Production methods certainly influence the environmental impact of animal-based foods, but popular alternatives must be fully assessed before being lauded as solutions. For example, while pasture-based beef production may have local benefits such as reduced soil erosion and nutrient losses, it often involves higher GHGE and system energy use per kilogram of beef than confinement feeding operations. Future technical advances are expected to improve the environmental efficiency of food production, but analysts project that these improvements will be insufficient to reach GHGE reduction goals, meaning shifts in eating habits are needed to reach such targets.

Red meat consumption also has significant impacts on human health. The science is clear that regular consumption of red meat contributes to risk of chronic diseases and premature death. Diets that include substantial amounts of red meat and products made from these meats increase risk of diabetes, heart disease, and some cancers. Nearly one in 10 premature deaths could be prevented in the U.S. if American adults were to cut their current red meat consumption to less than half a serving per day.

In 2015, the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) announced that processed meats such as hot dogs, bacon, and sausages should be classified as carcinogenic (Group 1) to humans for colorectal cancer. It was estimated that a 50-gram portion of processed meat eaten daily increases the risk of colorectal cancer by 18 percent. Unprocessed red

meats were classified as “probably carcinogenic” (Group 2A) because evidence suggests a link between regular consumption of unprocessed red meat and increased risk of developing colorectal cancer, as well as pancreatic and prostate cancer. The WHO report has significant implications for consumption of red and processed meats because these meats have already been associated with type 2 diabetes, cardiovascular disease, and other chronic disease. The WHO report on increased cancer risk further underscores the need for consumers to reduce their consumption of meats, especially processed meats.

On the flip side, eating plant-based, protein-rich foods, such as legumes and nuts, reduces the risk of chronic diseases and premature death. In the past year, new studies add further evidence to support the notion that replacing animal protein with plant protein can help prevent chronic diseases. In a large study from eight European countries, higher intake of animal protein was associated with an increased risk of developing type 2 diabetes, whereas vegetable protein was not associated with risk. The authors suggest that replacing animal protein with vegetable protein or other macronutrients may reduce the population-wide risk of diabetes.

The health effects of protein sources depend on comparison or reference foods. Compared to red meat, eggs and dairy products may have less adverse health impacts. There is little evidence that moderate consumption of eggs (up to one egg per day) has adverse effects on the risk of chronic diseases. However, consumption of dairy products may affect human health in complicated ways, including potential benefits and risks, which may depend on the types of dairy products. Dairy has been suggested to confer benefits on weight control and diabetes prevention, but the existing evidence does not support this notion.

In a recent study, Harvard researchers followed 41,436 men in the Health Professionals’ Follow-Up Study, 67,138 women in the Nurses’ Health Study, and 85,884 women in the Nurses’ Health Study II. They found that total dairy, milk, and cheese consumption was not significantly associated with risk of type 2 diabetes, and that yogurt was the only dairy product associated with lower risk of diabetes. This study refutes the widely held assumption that eating more dairy could help manage weight and prevent diabetes.

In a recent analysis of the Nurses’ Health Study and Health Professionals’ Follow-Up Study, higher intake of animal protein, particularly red and processed meats, was associated with increased cardiovascular mortality. They also found that substituting plant protein for animal protein, especially that from red and processed meat, was associated with lower risk of death including from cardiovascular disease.

Fortunately, the market has been responding with a flood of meatless protein alternatives, some from quite novel sources. Options abound for replacing meat with vegetable-based proteins—from the old standards of seitan, tofu, and tempeh, to protein-rich grains like quinoa, to mycoprotein-based Quorn™ and lupine, wheat, and rice-based food products designed to combine with meats. Insect-based proteins have also emerged on the menus of some restaurants in New York and California, and as featured ingredients in some new snack foods. Also growing are the creative uses of seaweeds and algae. Some evidence suggests that plant-based protein sources requiring significant processing, such as soy protein isolate, may approach the environmental footprints of animal based foods because of energy requirements in processing.

Recent years have also seen numerous studies exploring the environmental effects of diet change and the potential for diet shifts as a climate mitigation strategy. There is clear consensus that reducing animal-based foods in the diet can result in lowered environmental impact. A 2015 study showed that the total GHGE of the recommended diet in the 2010 Dietary Guidelines for Americans would be about the same as that of the current diet, despite a recommended 20-percent decrease in calories and reduced meat consumption. However, the vegetarian and vegan adaptations of the Dietary Guidelines reduce GHGE by 33 percent and 53 percent, respectively. A dietary pattern aligned with the Healthy Eating Plate recommendations made by Harvard T. H. Chan School of Public Health also shows a 33 percent reduction in GHGE without eliminating meat, largely through a shift from red meat to chicken, fish, nuts, and legumes, and reduced dairy consumption.

A 2016 study demonstrated that protein-equivalent plant-based alternatives to the beef portion of the average American diet are readily available, and provide mostly better nutrition considering the types of fat, key vitamins, minerals, and micronutrients. Further, these replacement diets require on average only 10 percent of land, four percent of GHGE, and six percent of reactive nitrogen compared to the replaced beef diet. Applied to 320 million Americans, the beef-to-plant shift would reduce national cropland acreage demand by 27 percent and total national GHGE by four percent.

RECOMMENDATIONS:

Chefs and the foodservice industry at large have an important role to play in leading and inspiring the new expectations about how much protein and what kinds of protein we need. Research shows that, when asked about changing meat consumption habits, individuals experience complex moral and psychological barriers. Information about negative outcomes is not enough: Eaters need leaders. Chefs should aspire to shift red meat from the center of the plate and instead include it as one ingredient among many in a dish, if at all. The Protein Flip resource provides delicious strategies for transforming protein menu concepts in your operation. There are many creative and flavorful ways to prepare meals in high-volume foodservice operations that put plant-based proteins front and center—while cutting costs, reflecting global cuisines, and reducing environmental damage along the way.

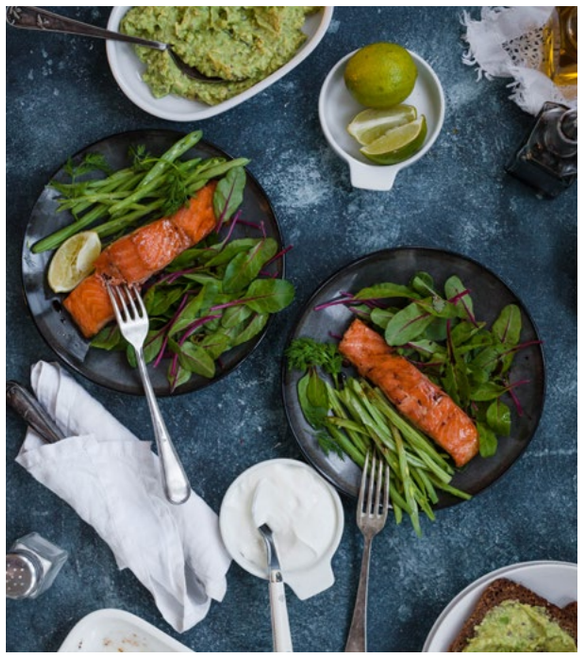
In general, healthy protein sources like fish and seafood, poultry, beans, and nuts should be used in place of red meats like beef, lamb, and pork, including processed red meats. There is no need to go overboard on dairy protein: One to two ounces of cheese or a cup of yogurt can be recommended for people who choose to include dairy as part of a healthy dietary pattern.

SCORE: 3

Progress continued in the past year, as red meat production and consumption in the U.S. again declined modestly, while plant-based choices became more widely available on Americas menus. Climate change played a role, reducing meat supplies and raising costs, providing the business case for further lowering meat consumption.

IN SUMMARY:

- High meat consumption, particularly red meat, has harmful effects on both human health and the environment.
- New studies add to existing evidence that shifts in eating habits toward more plant-based proteins, fruits, and vegetables can reduce the risk of certain chronic diseases, greenhouse gas emissions, and the burden on water and energy resources.
- Chefs are emphasizing new culinary strategies that make plants the stars on menus, and they can lead a cultural shift away from an overreliance on animal protein in the diet.



WHERE DOES OUR CORN COME FROM? AND WHERE DOES IT GO?

CORN PRODUCTION AND USES IN THE U.S.

1 B bu = 1 Billion Bushels

INVENTORY

1.7 B bu

PRODUCTION

13.1 B bu

DOMESTIC SUPPLY

11.1 B bu

DOMESTIC USE

2 B bu

EXPORTS

1.7 B bu

SEED

ENDING STOCK

ANIMAL FEED

5.1 B bu

2 B bu

CATTLE (INC. DAIRY)

1.7 B bu

POULTRY

1.5 B bu

HOGS & PIGS

4.6 B bu

FUEL ETHANOL

1.3 B bu

FOOD & INDUSTRIAL USES

HIGH-FRUCTOSE CORN SYRUP

GLUCOSE & DEXTROSE

STARCH

BEVERAGE ALCOHOL

CEREALS & OTHER PRODUCTS

Figure 2. Data (from 2009-2010 harvest) are courtesy of Changing Tastes and the Analytical Consulting Lab at the Northwestern University Kellogg School of Management. Kevin Heckman, Ben Reizenstein, Tim Carone, Arlin Wasserman, and Russell Walker, *Risk Information in the Corn Supply Chain*, Analytical Consulting Lab at the Northwestern University Kellogg School of Management, 2012.

FRUIT AND VEGETABLE CONSUMPTION AND PRODUCTION

While finding new ways to use local and heirloom varieties of produce continues to be among the top trends for America's chefs, the great hopes for increased fruit and vegetable consumption and production are not yet being realized.

Most people recognize compelling reasons why fruits and vegetables would, could, and, simply *should* become a larger part of the American plate:

- Increased fruit and vegetable consumption is great for our health. For good reason, the 2015 Dietary Guidelines for Americans (DGAs) encourage much greater intake of fruits and vegetables. Increased fruit and vegetable consumption has been associated with lower risk of cancer and heart disease. In 2016, new research out of Brigham and Women's Hospital and the Harvard T.H. Chan School of Public Health analyzed data from three major cohort studies, finding that this also could reduce risk of high blood pressure.
- Fruits and vegetables are in tune with consumers' desires for environmental sustainability. They offer some of the best connections with farmers and local food production systems. And, pound for pound, fruit and vegetable production has low greenhouse gas emissions relative to other food categories.
- There are great opportunities to innovate with fruits and vegetables in the restaurant sector, adding freshness and flavor to menus. In their forecast of food and beverage trends for restaurants in 2017, the consultants Baum and Whiteman reported "a surge of serious chefs tilting their menus toward vegetables along with increased interest from fast casual restaurant chains. This trend can be seen in new and growing concepts ranging from three-star Michelin chef Jean-Georges Vongerichten's vegetarian restaurant, abcV, in New York, to the Mediterranean fast casual chain, Cava Grill, which started in Washington, DC and is expanding rapidly in California and the Northeast.

However, the potential of fruits and vegetables is not yet being enjoyed in hard numbers reflecting total national consumption and production. Over the year since the previous *Menus of Change Annual Report*, this sobering fact has shown up consistently across multiple sources.

One important source of insight—loss-adjusted food supply data from the Economic Research Service of the U.S. Department of Agriculture (USDA)—describes how much food is available from production and net imports. In 2014, the most recent data available, the American food supply offered a per capita annual total of 645 pounds (fresh weight equivalent) of total fruits and vegetables, barely higher than the previous year. A decade earlier, in 2004, the corresponding per capita annual total was much higher, at 703 pounds, so long-term trends have not been favorable. The downward trend from 2004 – 2014 is observed separately for fruits and vegetables (and it is observed whether or not one counts potatoes for chips or frozen for fries within the vegetable category).

A second source is nationally representative survey data on what people actually eat and drink. Using data from multiple rounds of the National Health and Nutrition Examination Survey (NHANES) from 1999 to the most recent round in, a 2016 article in the *Journal of the American Medical Association* reported that Americans had made many improvements in the healthfulness of their food choices—more whole grains, less sugar-sweetened beverages, and a higher total diet score, for example—but no significant improvement in daily consumption of fruits and vegetables. The average daily intake was 2.3 servings per day in 1999 – 2000 and 2.4 servings per day more than a decade later in 2011 – 2012. In other words: barely moving the needle.

The federal government measures progress toward Healthy People 2020 goals for many health outcomes. In nutrition and obesity, the most recent progress report shows improvement in physical activity, but no improvement in mean daily intake of vegetables. To meet the target, an increase of about 50 percent would be needed.

Though one frequently hears that prices or U.S. agricultural production constraints are to blame, neither of these potential barriers provides a fully persuasive explanation.

In a USDA report this year entitled *The Cost of Satisfying Fruit and Vegetable Recommendations in the Dietary Guidelines*, analysts found that some sources of fruits and vegetables are surprisingly inexpensive. They estimated that a consumer on a typical 2,000 calorie diet "could satisfy Federal fruit and vegetable recommendations for $2.10 to $2.60 per day." While this is in principle affordable even within the Thrifty Food Plan—a frugal model diet that is used as a benchmark in the Supplemental Nutrition Assistance Program (SNAP)—the authors do note that this would require reallocating some spending from foods high in solid fats, added sugars, and sodium.

Likewise, it does not seem to be the case that U.S. farmers face insurmountable physical or economic barriers to supplying more fruits and vegetables. In USDA's 2016 *Vegetables and Pulses Outlook*, economists explained that the long-term decline in vegetable consumption "has been driven by declining use of potatoes, followed by head lettuce, sweet corn, and carrots, among others." For potatoes, domestic production actually has been increased, but a higher fraction of production is exported. The total land area assigned to other fruit and vegetable crops is small and not increasing much. In the Census of Agriculture, conducted once every five years, U.S. farmland use fell by more than seven million acres from 2007 to 2012 (a decline of just under one percent). During this time, vegetable production fell by 0.2 million acres (a decline of about four percent). Simultaneously, farmland for soybeans, which are heavily used in meat production, grew by 12 million acres (an increase of 19 percent). The issue brief "Land Use and Natural Resource Conservation" (page 39) has more detail about the role of imports and water scarcity in U.S. production areas for fruits and vegetables. All things considered, shortage of land or productive capacity is not what prevents us from having enough fruits and vegetables.

Instead, the issue may center on consumer demand. While most people recognize the terrific benefits of increased fruit and vegetable consumption, these opportunities have not yet come to "fruition." As the December 2016 report in *Nation's Restaurant News* on food trends for 2017 observed, "There's a lot of talk of cauliflower becoming the new kale, and of spiralized zucchini replacing pasta, but the bottom line is that Americans say they're interested in eating more vegetables, but they've shown that they're not going to give up on taste to do it." Tastes are not set in stone, but are formed over years, based on favorable exposure to delicious fruits and vegetable in many contexts, including very importantly, in foodservice settings and restaurants.

RECOMMENDATIONS:

- A meaningful upturn in fruit and vegetable consumption in the year ahead will require more widespread efforts that reach diners of every age.
- Beginning with children and youth, some policymakers have shown a willingness to reverse several years of improvements in federal school meal programs, with a particular focus on relaxing meal standards for fruits and vegetables. Chefs and the restaurant industry need to help defend and improve the improvements they helped to enact.
- Many consumers are seeking a new kind of dietary guidance that simultaneously connects with their interest in environmental sustainability as well as their own health, so jointly addressing both is a promising approach.
- Restaurants of all kinds—from quick-service and fast casual to full service— have a role in improving what we eat, with basic changes like making fruits and vegetables the default offerings in children's meals, putting colorful photographs on menu boards, offering them as seasonal special side items and entrées, and serving them up in appealing ways by doing what chefs do best.

SCORE: 3

The foodservice industry continues to find new ways to feature fruits and especially vegetables. However, despite a small increase in fruit intake, the potential of fruits *and* vegetables is not yet being enjoyed in hard numbers reflecting total national consumption and production.

IN SUMMARY:

- Food supply data and food intake data both show little change in consumption of fruits and vegetables.
- Interest is rising, well motivated by goals for public health nutrition, food production and the environment, and profitable innovation for the food retail and restaurant sectors.
- The challenge for the years ahead will be to convert this interest into a meaningful increase in the average amount of produce Americans eat each day.

FISH, SEAFOOD, AND OCEANS

The past year has brought a number of high points regarding seafood, but the overall level of improvement has stalled mainly from issues surrounding traceability.

First, the good news: Seafood made gains, both in U.S. consumption (American consumers ate nearly one pound more seafood per person than the prior year) and in politics. Last year, the White House dedicated its Champions of Change—a program to recognize people who do extraordinary things to make a difference in their communities—to seafood. It selected 12 industry professionals who contribute to the ongoing recovery of America's fishing industry and fishing communities for this prestigious award. Awardees included top marine scientists, sustainable seafood business leaders and entrepreneurs, a chef, and directors from a range of progressive organizations representing both fishery and aquaculture sectors. In another positive step, the National Oceanic and Atmospheric Administration (NOAA) and U.S. Department of State finalized the action plan of the President's Task Force on Combating Illegal, Unreported, and Unregulated (IUU) Fishing and Seafood Fraud. This body will lead the fight against black market fishing and seafood fraud and help provide American consumers with access to high-quality fish of known origin, while also preventing illegal fishermen from undercutting solid business practices. In addition, the White House expanded the Papahanaumokuakea Marine National Monument in Hawaii, a move to help protect Pacific stocks of fish.

However, at the same time the White House was expanding the national monument, news was breaking that undocumented foreigners were working without rights or protection on Hawaiian fishing boats. The task force rules should help stop the mislabeling of seafood, of which there are over 200 cases as revealed by a 2016 Oceana report. *Bloomberg Businessweek* also detailed an exposé on the use of antibiotics in fish and seafood production: Seafood tainted with antibiotics from China was reaching U.S. consumers. The shrimp were produced in China, but passed through Malaysia, where they were relabeled. This story highlighted the extensive use of antibiotics in some farmed seafood production, and calls for new focus from the many restaurant and foodservice companies and professionals committed to reducing the use of antibiotics in food production.

Outside of traceability, recent studies predict effects of climate change on fish and invertebrates. For instance, a review of 82 species in the Gulf of Maine and Northeast U.S. shelf found half will be negatively impacted by ongoing changes to climate. There is also some opposition to specific fisheries being Marine Stewardship Council (MSC) certified, one of the most public examples coming from World Wildlife Fund (WWF), a group that originally helped set up the MSC. The concern is over tuna fishing in the Indian Ocean that may not meet MSC criteria, yet MSC is taking steps to ensure product certification given that they gain revenue from licensed product.

Tuna was also in the news as three of the biggest U.S. brands were accused of collusion to not sell tuna caught using more sustainable methods. The tuna industry has faced pressure to stop using fish aggregative devices (FADs). Many species of fish beyond tuna, as well as turtles, are drawn to these floating structures giving them refuge from predators. That is a problem because fishing vessels then use purse seines to collect their target fish from under the FAD along with other non-target species. This lawsuit alleges the companies conspired to agree not to label fish caught as being FAD-free (in addition to colluding to decrease can weight while keeping price consistent).

RECOMMENDATIONS:

It is the job of all involved in the value chain to investigate their suppliers. As a foodservice operator, you need to know and trust your supplier so you can ask for products adhering to your sustainability purchasing specifications. This relationship will help you purchase traceable product from reputable dealers who know the source of their product. In addition, continue to support certification. Although it is still a work in progress and continually improving, certified seafood is better than product without independent third-party assessment. Be involved in the certification process: While a fishery or farm is undergoing certification, there will be a comment period. Read the report, and if you have information or something looks askew, provide comment. Also include fish and seafood in any policies or purchasing standards regarding antibiotic use. When it comes to designing your menus and serving your customers seafood choices that you and they can feel good about, all of these measures are important steps for understanding and knowing the origins, practices, and quality behind your selections.

SCORE: 2

This balance of good and bad news points to the reality of the seafood market: All involved in the seafood value chain (retailers, chefs, distributors, and restaurateurs) need seafood to please their customers, but at the same time, want them to believe in its quality and nutritional benefits. The drive to offer seafood adhering to sustainability criteria is forcing less scrupulous vendors to overpromise and under-deliver. Honest messaging regarding seafood sustainability should be a priority for this nutritious and efficient protein.

IN SUMMARY:

- Know and trust your supplier. You can be confident the product you purchase meets your sustainability and traceability requirements.
- Support certification. Certified seafood is better than product without independent third-party assessment.
- Be engaged. Ask questions of your suppliers, and comment while certification organizations are revising their standards.

CLIMATE CHANGE

Climate change is a growing threat to the U.S. food system. It threatens the ability of all Americans to obtain high quality, nutritious food on a consistent basis and in adequate quantities year round. Over the next few decades, temperatures will continue to rise, precipitation patterns will change, and unexpected and unusual extreme events will continue to occur. Direct effects on agricultural production are already being felt, particularly as 2016 was the third straight year with record-breaking global temperatures. However, indirect effects are being seen on parts of the food system beyond the farm gate. The impacts of severe weather on transportation and on the changing availability or price of perishable products may prove to be more important for the foodservice industry, along with other factors like harvesting and distribution.

Heightened appreciation for the indirect effects of climate change has also led to growing attention to the impact on food safety. Climate affects food safety through multiple pathways. While the complex, global supply chain upon which the foodservice industry relies may be better managed than in the past, it is increasingly vulnerable to food safety issues due to rising temperatures. Changes in air and water temperature in places where fresh ingredients are grown can shift the seasonal and geographic occurrence of bacteria and viruses on fruits and vegetables. These pathogens are introduced into the food before they are harvested and processed, making contamination of the food supply by new pathogens more likely. Although it is not possible to link specific events directly to a changing climate, higher temperatures are likely to cause increased food contamination. Because the growth of E. coli colonies is very sensitive to temperature, more bacterial contamination of food in restaurants is likely in coming years.

When food is harvested, higher numbers of bacteria due to higher temperatures increases the probability that cooking or cleaning of ingredients fails to remove all colonies. An increase in average temperatures of 3.6–5.4 degrees Fahrenheit would halve the shelf life of food, requiring more refrigeration of food and a greater attention to food safety in the foodservice industry. The Centers for Disease Control and Prevention (CDC) estimates that each year one in six Americans (48 million people) gets sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases.

Toxins that are formed by fungi as they grow on crops can also be a significant food safety hazard. In 2016, above average rainfall in the northern Great Plains resulted in high fungal contamination of the corn crop. Nearly 18 percent of samples taken of the recently harvested crop contained six to seven different toxins produced by fungus growing on the corn, and 42 percent had four to five toxins present. Although most corn is used as an animal feed, there is significant pass-through of these toxins through milk or meat from animals eating contaminated grain.

Elevated sea surface temperatures due to climate change will lead to greater accumulation of mercury in seafood, and encourage the growth of dangerous algae that can produce marine biotoxins that concentrate in shellfish and bottom feeding crustaceans such as lobster. In the fall of 2016, an algae bloom producing domoic acid—a biotoxin that can cause illness, memory loss, brain damage and possibly death in humans—closed down a third of Maine's coastline to clam, mussel, and oyster harvesting this fall and caused a massive recall of shellfish from the state. Although this particular algae bloom was a first for Maine, it was one of many on the East Coast in 2016 due to significantly high sea surface temperatures, most likely driven by climate change, combined with nutrient pollution from large coastal cities.

New movements are cropping up in the food and foodservice industry to acknowledge the contribution of food production and consumption to the problem of rising temperatures. A good example of this is ZeroFoodprint, a non-profit organization focused on providing tools to help restaurants reduce their carbon footprint. For example, they provide carbon footprint information for different cuts of beef to encourage chefs to consider the whole animal and the cost to the climate of those different cuts. Unfortunately, regardless of the cut, beef has approximately 20 times the carbon footprint of plant proteins such as lentils.

A much more comprehensive and aggressive effort is needed to reduce how much beef and other animal protein is consumed in American restaurants, and to greatly reduce the amount of food wasted every year. Focusing on locally produced, plant-based foods, and making it easier for each person in the United States to reduce the amount of beef he or she consumes will enable the foodservice industry to contribute to the solution instead of the problem. For its part, the Menus of Change initiative has engaged more than 300 restaurant companies and over 1,000 executives in a movement towards more sustainable diets. This movement also includes dozens of leading colleges and universities that now participate in the Menus of Change University Research Collaborative.

RECOMMENDATIONS:

Improved traceability in food supply chains can reduce the impact of foodborne illnesses by fast and precise food recalls. Fragmented value chains among both the suppliers and the commercial customers of food result in limited safety standards and little accountability from farm to table. Foodservice operators should insist on disclosure and clear traceability information about transportation and logistics; cold-chain information for food purchased is an important first step. Foodservice operators need to become better educated about environmental threats to the specific ingredients on which their operations rely. Knowing where your ingredients come from—and the health of the surrounding ecosystem or agricultural system, as well as how those ingredients get to your doorstep—is critical to having confidence in your operation's food supply amid a changing climate.

SCORE: 1

Although the U.S. foodservice industry is starting to think about low-carbon menu options, food safety concerns due to rising ambient temperatures further underscore the need for more substantial action and discussion about ways to reduce the industry's contribution to the climate problem. The lack of reliability in sourcing, more frequent extreme weather events, and current menu designs that rely on imported food all contribute to greenhouse gas emissions and increase the vulnerability of the food system to climate. Much can be done to reduce these impacts by promoting menu options that have lower carbon and water footprints, and ensuring that energy in the food sector is carbon neutral.

IN SUMMARY:

- An increase in average temperatures of 3.6–5.4 degrees Fahrenheit would halve the shelf life of food, requiring more refrigeration of food and a greater attention throughout the foodservice industry to food safety.
- E.coli and other bacteria are sensitive to the average ambient temperature on farms and in processing and storage areas. High ocean water temperatures may result in algae blooms that affect seafood and shellfish, and very wet weather can result in contamination in cereals that may affect meat and milk supplies.
- Tracking food recalls and demanding comprehensive traceability data on perishable and fresh food items is important to ensure high-quality, safe ingredients.

LAND USE AND NATURAL RESOURCE CONSERVATION

Is there a balance between U.S. agricultural production and the needs of American dietary patterns? Are we nurturing our land in a way that restores and regenerates our natural resource base while nurturing our bodies through healthy eating habits? There is both a simple ("no") and a complex ("it depends") answer to this question.

We have the land capacity to produce a healthy dietary pattern for all Americans: A recent report showed current U.S. rangeland and farmland can support the dietary needs of 130 percent to 261 percent of the current U.S. population depending on specific dietary patterns. The major determinant is the average consumption of meat and dairy products, which require relatively more land to produce but also can take advantage of the western rangelands and perennial pastures. So, yes, there is plenty of land to match production with healthy ways of eating, but that's not the production pattern for farms and ranchlands in the U.S. today. Furthermore, this simple equation doesn't address the environmental attributes or negative impacts of food production and distribution.

There are three main issues. First, we annually import large amounts of produce—a recent *Nature* article highlights the negative impact of exports on biodiversity in locations supplying these imports, such as Central America. Second, national carrying capacity says nothing about where in the U.S. it could be most beneficial to produce different foods relative to a variety of environmental attributes (for example, managing phosphorus and nitrogen cycles through judicious recycling). Third, on average our consumption patterns are far from those needed to promote full health. As outlined in the 2015 scientific report of the Dietary Guidelines Advisory Committee, we should, in part, increase consumption of whole grains, reduce meat, and increase fruits and vegetables while decreasing total calories.

Increasing whole grain consumption wouldn't require additional production. However, we produce far fewer fruits and vegetables than we should consume, and our average consumption is well below recommended levels. We import far more produce than we export—nearly twice as much—and we import an ever-increasing amount of produce in total (with the largest share coming from Mexico). Domestically, where these fruits and vegetables are produced can also have negative impacts (e.g., the bulk of our winter Romaine lettuce comes from the American Southwest, meaning a high-water crop being produced in a low-water environment).

In thinking about global ecosystem integrity, there is a range of considerations to be accounted for. The most useful global approach is the "planetary boundary" concept, which considers climate change, biosphere integrity (functional and genetic diversity), novel entities, stratospheric ozone depletion, atmospheric aerosol loading, ocean acidification, biochemical flows (nitrogen and phosphorus cycles), freshwater use, and land system change. While it is hard to measure all of these global systems on a national or regional basis, we can make some generalities. In doing so, at least four strategies emerge that could improve the U.S. picture with respect to environmental boundaries:

1. Decrease livestock production (including feed production) as currently practiced. Phosphorus runoff into the Gulf of Mexico could be reduced dramatically if the most erodible land in the Mississippi Basin were taken out of row crop (feed) production and planted into perennial crops (e.g. pasture grasses and legumes). These changes would increase bird habitat, among other benefits.
2. Increase regional production of fruits and vegetables, including off-season via high tunnels (unheated greenhouses). For example, research has demonstrated a lower relative carbon footprint of high-tunnel greens produced in the upper Midwest compared to shipping from the West Coast.
3. Encourage a more seasonal diet. It's important to source more locally and domestically grown foods, but in the off-season, we will never produce the same mix locally as can be done in-season. Chefs and foodservice professionals could be more strategic in menu design and sourcing efforts, emphasizing fruits, vegetables, and other foods that are in-season and produced sustainably off-season. It's equally useful to start driving demand away from production that is wildly out-of-step with the local and regional ecosystems – for example, buying water-intensive crops from drier parts of the country.
4. Reduce production of high-water crops in low-water environments (e.g. Romaine lettuce in the American Southwest), and distribute this production across the country.

RECOMMENDATIONS:

There are many steps that chefs can take in their operations as well as supporting public policy improvements. For instance, in the reauthorization of the Farm Bill, it would be beneficial to increase the Conservation Reserve Program, which encourages removal of highly erodible land from production. Similarly, while much effort has been made to reduce phosphorus run-off, a great deal more is needed. Increasing perennial plant cover has biodiversity benefits, and despite some decrease in U.S. meat consumption, it's not nearly enough relative to sustainable land and natural resource use. Chefs and foodservice professionals should offer smaller portion sizes and leverage strategies provided in the CIA's *Protein Flip* resource.

Chefs in the northern latitudes can purchase more out-of-season products from local sources and develop more seasonal menus. There has been a strong expansion of regional fruit and vegetable production—both seasonal and off-season, through expansion of hoop house and greenhouse construction—partially driven by U.S. Department of Agriculture programs. Chefs and foodservice companies can encourage an expansion through their sourcing programs.

SCORE: 2.5

While there has been a great deal of movement around local food sourcing, it is still a limited amount of the total food environment. Although soil erosion and phosphorus contamination of surface waters have been reduced, the levels are still far above where they should be. Biodiversity preservation in the U.S. and abroad continues to be challenged by both food imports and the extent of land use for agriculture.

IN SUMMARY:

- U.S. agricultural lands are capable of producing sufficient food for a large population; how many is primarily dependent on meat consumption.
- Dietary patterns that enable healthy Americans *and* production patterns that encourage natural resource preservation and restoration can be mutually compatible.
- Changes in production patterns to more fully match dietary guidelines could have positive environmental benefits if done thoughtfully.

WATER SUSTAINABILITY

In 2016, the United Nations, in its latest World Water Development Report, highlighted the link between sustainable management of water resources and employment. Globally, three out of four jobs are water-dependent. Farming, fisheries, and the forestry sectors alone—the most heavily water-dependent—employ nearly one billion people. Agricultural production is responsible for over 70 percent of global water demand, and more than two-thirds of global water consumption is for irrigated agriculture, which provides 40 percent of global agricultural production. Jobs in the foodservice industry therefore indirectly depend heavily on water security.

The International Food Policy Research Institute (IFPRI) estimates that nearly half of global gross domestic product (GDP), more than half of the global population, and 40 percent of grain production could be at risk due to water stress by 2050. These are no small matters for the foodservice industry. Water stress will be driven by increased urban demands as population increases, especially in developing countries, but also by increasing demand for agricultural production of foods. In past years, we have pointed out in this report how animal foods are sometimes particularly water intensive. Warmer—and in some parts of the world, drier—climate conditions will contribute significantly to increased water demand in some agricultural regions. A 2016 MIT study showed that climate change will also alter growing conditions and water demands for many major food staples due to both increased temperature and changes in precipitation patterns and amounts. Climate change and growing food demands will be challenging for water resources management, while potentially also reducing protein and nutrient quality of cereals.

The United Nations report therefore urges additional efforts to adapt to increasing water stress to avoid potentially dramatic effects on trade and migration as a result of drastic economic losses from dwindling reliable water supplies. The food and foodservice industry, through its close relationship with agriculture, has a critical role to play in addressing increased water security. Specifically, there is a need for more menu innovation around options that reduce the emphasis on red meat and emphasize fruits, vegetables, and plant proteins.

In the United States, 2016 brought some relief to drought-stricken California, mostly to northern California, while central and southern California continued a now five-year extreme drought pattern. California's extensive water infrastructure—its reservoirs and water conveyance system—delivered some limited relief to central and southern California from the northern part of the state.

At $600 million, total economic impact from the drought in 2016 was estimated to be significantly lower last year than in 2014 or 2015, when costs exceeded $1–2 billion each year.

In the meantime, New England and parts of the Southeast are developing significant drought conditions that have already affected local food supplies, particularly in New England, where farmers are ill equipped to cope with additional irrigation from groundwater or surface water.

More food and foodservice companies should follow in the steps of initiatives such as General Mills, Hormel Food, or Kellogg's. General Mills has developed an explicit water stewardship policy that governs not only its operations but the relationships it develops with its suppliers, which—in General Mills' case—are responsible for 99 percent of its water use. General Mills' water policy commits the company to actively engage with suppliers, local communities, government agencies, NGOs, and industry to improve priority watersheds where operations or suppliers are located. Water risk considerations are explicitly considered in business decisions including locating new facilities. Water sustainability efforts target water use and water quality impacts. Hormel Foods has committed to developing a comprehensive water stewardship policy that is setting water management goals beyond regulatory compliance for its suppliers. Kellogg's has partnered with the Midwest Row Crop Collaborative to actively engage in addressing water quality degradation in the Gulf of Mexico and groundwater depletion. The company is also partnering with farms to eliminate post-harvest loss of food. MillerCoors, in similar efforts, has begun working with farmers supplying its barley, malt, and hops to reduce the water footprint.

Companies work with a wide range of governmental, NGO, and community partners including the United Nations Development Programme, the United States Agency for International Development, World Wildlife Fund, and The Nature Conservancy. Another resource is the AgWater Challenge, a collaborative effort for water stewardship and sustainable food sourcing in the food and beverage industries.

These are some of the few existing examples where the food industry has strongly engaged on water sustainability issues. But it must act faster. The time is ripe for the foodservice industry to begin a broad, national, and possibly global, strategic process of engaging in discussions about changes in diets necessary to meet the challenges of future land and water resource use.

Engagement on water footprint and water sustainability is not a matter of one-size-fits-all. Unlike carbon emissions, which have similar effects around the globe, pound for pound, each watershed and each groundwater basin has its own unique structure and set of complex issues. While some actions are beneficial across most watersheds or groundwater basins, local partnerships and watershed-/groundwater basin-specific considerations are important. The Alliance for Water Stewardship—an inclusive, diverse global partnership with industry, environmental NGO, and other partners that are engaging in sustainable water practices—has recently developed a first version of an evolving international water stewardship standard. Figure 3 below outlines the key elements of any organization's approach to engaging in sustainable water management. Engagement is adaptive and flexible across the six areas outlined. The long-term aim is to achieve good water governance, sustainable water balances, sustainable water quality status, and healthy status of specific important water-related areas. The standard provides an overview of key areas that foodservice providers may consider as they become further engaged in water stewardship and sustainability.

Opportunities for engagement will vary from state to state, partly due to the hydrologic and geographic diversity across the U.S., and partly due to the

Figure 3: The steps and continuous improvement of the International Water Stewardship Standard (or "the Standard") set by the Alliance for Water Stewardship (AWS), published with the permission of the AWS (allianceforwaterstewardship.org).

varying governance, especially on groundwater resources. This year, California is beginning the implementation phase of its new Sustainable Groundwater Management Act. There, local or regional Groundwater Sustainability Agencies are beginning to discuss Groundwater Sustainability Plans and are engaging stakeholders across various sectors in their deliberations. These local activities provide potentially attractive opportunities for foodservice providers to engage with their agricultural producers.

Like other food sectors, the foodservice industry may still realize innovative solutions to reduce water consumption, increase water reuse, and decrease waste discharge, including food waste discharge. Food waste in particular represents significant potential for reduced water use, namely through the "virtual water" waste embedded in food's water footprint. More importantly, the foodservice industry may realize even larger water sustainability impacts by increasing its role in diverse local, regional, and global partnerships with agricultural and food suppliers to help reduce water risks in agricultural production and move toward sustainable farming practices. Chefs and foodservice providers can adjust menus by understanding the impacts of food production. Menus may favor sustainable suppliers, while also minimizing the water footprint and water quality impacts across the food portfolio that a menu represents. Increasing the appeal of plant-forward menu options would be one such step in the right direction.

RECOMMENDATIONS:

There is no one-size-fits all sustainable water solution for chefs and foodservice leaders. Chefs and operators should source from growers demonstrating sustainable groundwater and water management practices, along with reduced use of agricultural chemicals and waste impacts to water quality. Menus can feature foods with lower water footprints, which often are those with the smallest carbon footprints. Menu decision-makers should also consider quality impacts to groundwater or surface water (nitrate and other fertilizer pollutants and pesticides), so they are encouraged to consult online resources to calculate the nitrogen footprint of various foods. Reduced red meat purchases, plant-forward menus, and farm-to-fork business strategies are some promising advances, with flexibility to learn from and adapt menus to water scarcity in regions that produce significant amounts of food.

Larger food and foodservice companies may be able to build outreach programs to engage with groups of growers directly on reaching measurable outcomes regarding water supply and quality. Such programs often require familiarity with local conditions to prioritize the most promising solutions.

SCORE: 2

The U.S. food and foodservice industry is beginning to pay attention to water issues as drought and groundwater depletion weigh heavily on profits and as water scarcity is recognized as a high-priority global crisis. Consuming less meat and a new preference for hardier greens help, but these trends do not yet reflect broad-ranging, conscious efforts by the industry. Culinary professionals can play a diverse yet critically important role in finding sustainable water solutions.

IN SUMMARY:

- Agricultural production is responsible for over 70 percent of global water demand. Three out of four jobs globally are water dependent. Long-term water security is closely tied to food security and therefore to economic success in the foodservice industry. Climate change, population growth, and dietary changes are putting increasing pressures on global water resources.

- Only a few examples are emerging of companies in the food sector successfully engaging with producers, communities, NGOs, and government partners to consider water supply and water quality impacts of their food sources.

- There is no one-size-fits-all solution for crafting menus that strongly support water sustainability. It is helpful to menu smaller and fewer meat items, along with larger portions of fruits and vegetables, whole grains, plant proteins, and other plant-based flavors. Attention to water and environmental conditions in regions that grow food, as well as engagement with growers and food suppliers on sustainable water practices, are important steps toward finding more specific long-term solutions.

GALLONS OF WATER USED IN FOOD PRODUCTION PER SERVING

INDUSTRIALLY RAISED LIVESTOCK

- 23.5 Eggs — 18.1 green, 1.9 blue — 2 oz.
- 38.6 Chicken — 30.3 green, 3.1 blue — 3 oz.
- 38.6 Turkey — 30.3 green, 3.1 blue — 3 oz.
- 41.5 Yogurt — 33.8 green, 3.1 blue — 6 oz.
- 44.3 Cheese — 35.9 green, 3.5 blue — 1.5 oz.
- 123.8 Pork — 92.2 green, 14.5 blue — 3 oz.
- 320.3 Beef — 292.1 green, 11.8 blue — 3 oz.

PLANT-BASED FOODS

- 7.6 Tomatoes — 1.9 green, 4.4 blue — 8 oz.
- 14.6 Tofu — 13.8 green, 0.8 blue — 1 oz.
- 18.1 Peanuts — 13.5 green, 2.7 blue — 1 oz.
- 19.5 Broccoli — 9.6 green, 4.9 blue — 8 oz.
- 44.5 Lentils — 7.9 green, 0.4 blue — 1 oz.
- 58.3 Dry Beans — 9.1 green, 3.2 blue — 1 oz.
- 97.8 Nuts (tree) — 17.5 green, 30.5 blue — 1 oz.

Total Water is made up of Green, Blue, and Grey water (from runoff)

Green Water (from rainfall)

Blue Water (from groundwater, lakes, and rivers)

Figure 4. Source Data: m3/ton in Water Footprint Network Water Statistics Table (Animals, Crops) for the U.S.
Sources: T. Harter, 2015, Changing Tastes, 2015 and M.M. Mekonnen and A.Y. Hoekstra, "The Green, Blue and Grey Water Footprint of Crops and Derived Crop Products," and "The Green, Blue and Grey Water Footprint of Farm Animals and Animal Products," Value of Water Research Report Series No. 47 and 48, UNESCO-IHE, Delft, the Netherlands, 2010.

AGRICULTURE, DRUGS, AND CHEMICALS USE

At the 69th World Health Assembly in Geneva last spring, World Health Organization (WHO) director general Margaret Chan warned of the three "slo mo" disasters confronting global public health: antibiotic resistance, climate change, and non-communicable disease. All three are tied to industrial agriculture, especially industrial food animal production.

Most of the largest U.S. restaurant, hospitality, and foodservice companies have taken on this challenge. Well over half now have in place commitments to reduce or eliminate antibiotic use in their supply chains in the next few years.

But the U.S. Food and Drug Administration (FDA)'s annual update on antibiotics sold or released for use in food producing animals shows that antibiotic use in livestock production has yet to decline and, rather, is still increasing (albeit at a slower rate), despite the commitments of so many restaurant companies.

The important distinction is among species. The poultry industry has responded to restaurant industry leadership and consumer demand in a more substantial way than the swine and dairy industries. Progress in reducing the use of non-therapeutic antibiotics, given to healthy animals, merits a score of 4. However, progress remains stalled overall, earning a score of 3, because of the continued use of subtherapeutic antibiotics, given to healthy animals for disease prevention, in the swine and dairy industries. By comparison, doctors treating people know to only prescribe antibiotics to sick people and only when absolutely needed in order to prevent resistance to medical treatments.

The new U.S. Department of Agriculture (USDA) requirement for reporting of antibiotic sales and use by species will clarify the problem in the next reporting cycle, providing the restaurant, hospitality, and foodservice companies the information they need to focus their pressure on the supply chain to reduce antibiotic use. There is also extensive use of antibiotics in farmed fish and seafood production in some parts of the world. Use of antibiotics in aquaculture can be even more intensive than for poultry, beef, and pork production.

The danger of antibiotic resistance took an alarming turn in 2016. In January carbapenem-resistant Enterobacteriaceae (CRE) were found in the feces of dairy cattle in Texas and New Mexico, while CRE have previously been found on farms in Europe and Asia. Carbapenems are the final line of defense against dangerous human pathogens. Then a CRE was isolated on a Midwestern hog farm indicating that it is spreading and present in a concentrated animal feeding operation (CAFO) setting where bacteria freely exchange resistance genes. Because of their importance to human medicine, carbapenems have not been approved for use in animals. The presence of CRE in hogs and dairy cattle operations probably arose from the use of ceftiofur, an antibiotic that is approved for use in industrial food animal production that attacks bacteria in a similar manner to its chemical relative, carbapenem.

The Centers for Disease Control and Prevention (CDC) reported that last August the Washoe County Health District in Reno, Nevada received a report that a patient was infected with a type of CRE that was resistant to all available antimicrobial drugs, including the 26 antibiotics available to treat people in the U.S. The patient died from the infection. All told, 2016 may go down as the dawn of the post-antibiotic era.

The FDA reported that antibiotic use in food animals had slowed to a one percent increase in 2015 (the most recent year for which data are available), the lowest rate of increase since 2009. But there was a faster, two percent, increase in the use of the antibiotics doctors also use to treat sick people, or "medically important" antibiotics. By comparison, the overall increase in use of medically important antibiotics in livestock production had increased 22 percent from 2009 to 2014.

Another milestone last year was the change in Animal Drug User Fee Amendments (ADUFA) rules requiring drug producers to report sales by species (cattle, swine, poultry. This sheds a bit more light on the relationship between antibiotic use and changing resistance patterns in different food animals. This more detailed information on use by species may help explain where the slow increase in antibiotic use is occurring even as major poultry producers pledge to eliminate low-dose use. Alarming news in the FDA annual report was the information that some species of bacteria in cattle are showing increasing resistance to ciprofloxacin, a medically important antibiotic commonly used to treat infections in humans and the only antibiotic available to treat anthrax in people. Furthermore, turkey samples are showing substantial increase in multi-drug-resistant strains of salmonella.

Still remaining a major problem is the loophole in the FDA's Guidance for Industry #213, which called upon drug manufacturers to voluntarily eliminate labeling for growth promotion but allows continued use of low-dose antibiotics for disease prevention, and thus allows the conditions to persist for optimal selection of spontaneous genetic mutations conveying antibiotic resistance in bacteria. Given that the dosages and routes of administration through water and feed are the same for growth promotion and for disease prevention, Guidance #213 is proving to be a toothless tiger in the regulatory domain. An important provision of Guidance #213 went into effect December 31, 2016, prohibiting animal producers from buying antibiotics off the shelf at the local feed store and calling for voluntary compliance by drug producers to move their antibiotics from over-the-counter to veterinary feed directives or prescription status.

Significant progress has occurred over the past three years in eliminating organic arsenicals from the food chain. FDA approvals for roxarsone—the most widely used organic arsenical in broiler production—arsanilic acid, and carbarson were withdrawn in September 2013 after the conversion of organic to inorganic arsenic was shown to occur by bacteria in the bird's intestine, leading to accumulation of inorganic arsenic, a grade one carcinogen, in the meat and liver of the broilers. In 2016, researchers at the Johns Hopkins Center for a Livable Future published similar findings for nitarsone, an organic arsenical widely used in turkey production to control blackhead disease. With the finding of inorganic arsenic in the turkey meat, approval for nitarsone was withdrawn by the FDA in December 2015, effectively ending human dietary exposure to inorganic arsenic in chicken and turkey meat.

Restaurant industry commitments and consumer demand continue to grow for animal products raised without antibiotics. Purdue claims that it now raises 95 percent of its broilers without antibiotics, and Tyson says it will eliminate the use of antibiotics in all of its broiler flocks in 2017, although it plans to continue using ionophores (antibiotics not used in human medicine but possibly capable of stimulating the emergence of resistance genes to antibiotics used in humans). As of the end of 2016, Subway began serving only chicken raised without antibiotics and has embarked on a two- to three-year transition to using only antibiotic-free turkey. Subway's transition to beef and pork raised without antibiotics will not happen until 2025 and does not include the more than 530 outlets in China.

The leading seller of chicken in the U.S., Chick-fil-A, has committed to serving only chicken raised without antibiotics by 2019. Burger King, Kentucky Fried Chicken, Tim Hortons, and Wendy's have announced their plans to join McDonald's in 2017 in serving only chicken from growers who don't use antibiotics.

In 2016, Panera Bread announced it had achieved its goal of serving no chicken, turkey, ham, or beef from producers using antibiotics. The foodservice industry, through its sourcing decisions, is pressuring producers to restrict the use of low-dose antibiotics in animal husbandry. The poultry industry is responding more than the pork, dairy, and beef sectors—areas where the foodservice industry could push harder for antibiotic-free animal products.

RECOMMENDATIONS:

The FDA should ban all use of low-dose antibiotics for disease prevention, and Congress should pass the Preservation of Antibiotics for Medical Treatment Act (PAMTA), which is legislation banning the use in animals of certain classes of antibiotics important for treating human infections. Education of the public about the dangers of antibiotic resistance should continue in order to increase demand for antibiotic-free meat. Chefs and foodservice operators can play a vital role by sourcing their animal products from producers who raise their animals without the use of low-dose antibiotics for growth promotion or disease prevention. Fish and seafood should be included in any antibiotic reduction policies. Operators also need to carefully monitor progress in their supply chains and ask for regular updates on changes suppliers are making to achieve long-term commitments to reduce antibiotic use.

SCORE: 3

Antibiotic use in industrial food animal production increased by two percent in 2015, and although the rate of increase has slowed considerably, the loophole allowing the use of low-dose antibiotics for disease control remains. This is somewhat offset by the steady increase in the number of chain restaurants pledging to source animal products, especially poultry, from producers pledging to raise their animals without antibiotics.

IN SUMMARY:

- Despite some advances in the restriction of some antibiotics such as organic arsenicals, the FDA reports continued growth in the amount of antibiotics used in industrial food animal production.
- Major threats to human health appeared in the past year with the emergence of two critical types of resistant bacteria in food animals in the U.S.
- Consumer demand for animal products raised without antibiotics is having a major impact on the chain restaurant industry, whose sourcing policies are now positively influencing the industrial food animal producers, especially the poultry industry.

HEALTHY FOOD VS. HEALTHCARE SPENDING AND TRENDS IN MEDICAL-CULINARY EDUCATIONAL ALLIANCES

It is currently uncommon for medical, culinary, agricultural, and other food industry communities—responsible for trillions of dollars of the U.S. economy—to share data, skills, questions, and ideas, or partner in efforts to diminish rates of obesity, diabetes, and other diet-related health problems. This is a missed opportunity for a variety of reasons.

In 1960, the total annual U.S. expenditures for food were estimated at $74.6 billion. This was nearly three times as much as the total expenditures that same year of $27.2 billion for healthcare. Fast forward to today. U.S. citizens spend $1.5 trillion on food and $3.2 trillion on healthcare, flipping the ratio, with healthcare spending now twice that of food. These sobering statistics document a 20-fold increase in food expenditures over the past half-century, as compared with a 118-fold increase in healthcare expenditures over the same period of time.

While the escalation of healthcare costs in the U.S. can be tied to multiple factors beyond food and lifestyle, the enormous financial toll of the continuing diet-linked obesity and diabetes crises has been well documented. This, together with the larger perspective that an estimated 75 percent of chronic diseases (all with attendant impacts on U.S. healthcare costs) are linked to diet and lifestyle factors, suggests an urgency in fostering greater collaboration between the medical and culinary communities.

Beyond the opportunity to widen partnerships to advance the availability and active choosing of healthier foods, other related factors are likely important to be considered as well, including the decline in home cooking and culinary literacy. From 1965 to 1995, there was a 50 percent decrease in the amount of time that Americans spent cooking. In 2016, a Harvard study suggested that people who eat meals prepared at home more frequently have a lower long-term risk of developing diabetes. Each 30 minutes of reduced cooking time per day was associated with a 0.5 increase in Body Mass Index (BMI).

This study is significant not only because of the result, but because of its substantial size: It involved 2.1 million person years of follow-up, meaning the study had a very large number of people who each spent a long time participating in the study. Regrettably, however, physicians do not typically receive training with regard to dietary, lifestyle, or culinary counseling, nor are these items currently included in their required courses or certification examinations.

Over the past few years, several studies have been published exploring the relationship between time spent cooking and the quality of one's diet. The majority of these studies suggest that the more time spent cooking, the higher the dietary quality.

Increasingly, the hypothesis remains that teaching both healthful nutrition and health-based culinary skills to individuals—whether as adults or as children—may increase their likelihood of choosing a healthier diet and lifestyle. In recent years, some interesting pilot programs have emerged. The Chicago-based nonprofit, Common Threads, partners with 114 schools in underserved communities to teach children, their families, and teachers, hands-on, culturally relevant, cooking and nutrition skills. With the help of their professional chef instructors, Common Threads is working to prevent childhood obesity and build a school-wide culture of health. Lovin' Spoonfuls is a Boston-based food rescue organization with a focus on fresh fruits and vegetables, lean proteins, and whole grains. Through its program Plenty, the organization is now offering free cooking classes in which prominent Boston chefs teach low-income people in crisis centers, shelters, food pantries, and community centers how to cook healthy meals with limited budget and ingredients. The non-profit Wholesome Wave launched a Fruit and Vegetable Prescription Program that allows doctors to give money to families struggling with diet-related disease to buy fresh fruits and vegetables at local farmers' markets. Since its launch in 2011, the program has reached 8,425 individuals and family members in 10 states. Of the participating patients, 69 percent have increased their fruit and vegetable consumption. Kaiser Permanente runs more than 50 farmers' markets at its various hospitals and has recently

launched a program to deliver healthy, non-processed foods to the homes of post-operative patients. Gardens to Hospitals is an innovative "ecopreneurial" company that builds and maintains hydroponic greenhouses on hospital property, supplying fresh vegetables 12 months per year. And finally, at the annual Healthy Kitchens, Healthy Lives® educational conference—co-presented by The Culinary Institute of America and the Harvard T.H. Chan School of Public Health—in 2017, 33 percent of the professional healthcare attendees reported that their hospitals and/or health systems already had built a demonstration or teaching kitchen, or had plans to do so in the coming 24 months.

Over the past year, considerable progress has been made with regard to the establishment of joint, medical-culinary partnerships. Specifically, the CIA and Harvard T.H. Chan School of Public Health have continued their partnership in leading the ground-breaking Teaching Kitchen Collaborative (TKC) that was launched in 2016 and expanded in 2017. Now composed of 32 organizations from the corporate, medical, community, and educational sectors that have developed prototype teaching kitchens and teaching kitchen-related curricula, the collaborative has been built with the intention of establishing best practices and testing these across various populations. These include patients, corporate employees, college and university students, K-12 students, retirees, and others.

In addition, the Tulane University Goldring Center has developed a curriculum for medical student training in "culinary nutrition." This curriculum has been licensed by more than a dozen U.S. medical schools and is being formally studied for its impact on patients with diabetes.

While formal research to assess the value, or lack thereof, of this rapidly expanding range of culinary-medical partnerships is still in its infancy, this past year has demonstrated an increased readiness on the part of the medical establishment to formally evaluate these novel educational interventions.

These trends and programs are exciting, early phases of innovation and development, and they require the ongoing support of the medical, public health, culinary, corporate, and tech sectors. Foodservice operators are encouraged to visit **tkcollaborative.org** to learn whether an established teaching kitchen program exists in their geographic area in an effort to explore opportunities for collaboration, or to learn more about classes and recipes that may inform their respective menus and offerings.

The goal to enhance the relationship between judicious food expenditures and judicious healthcare expenditures will be realized when more robust collaborations between the medical, public health, culinary, and sustainability communities become ever-more interdependent and concerted; and, when they are made replicable, scalable, and shown to predictably improve eating behaviors, health outcomes, and costs.

IN SUMMARY:

- In 1960, Americans spent nearly three times as much on food as they did on healthcare. Today, Americans spend twice as much on healthcare as they do on food.

- The relationships between cooking, dietary choices, and potential positive health outcomes are just beginning to be studied formally as alliances between health and culinary organizations begin to take shape.

- Over the past year, an increasing number of innovative partnerships involving the culinary, medical, public health, tech, and sustainability sectors began to develop. These programs, curricula, and pilot projects now set the stage for demonstrations and formal studies to assess the value of such partnerships in terms of their ability to change eating and lifestyle behaviors predictably and sustainably; to impact health outcomes; and, ideally, to lower healthcare costs and enhance productivity and quality of life.

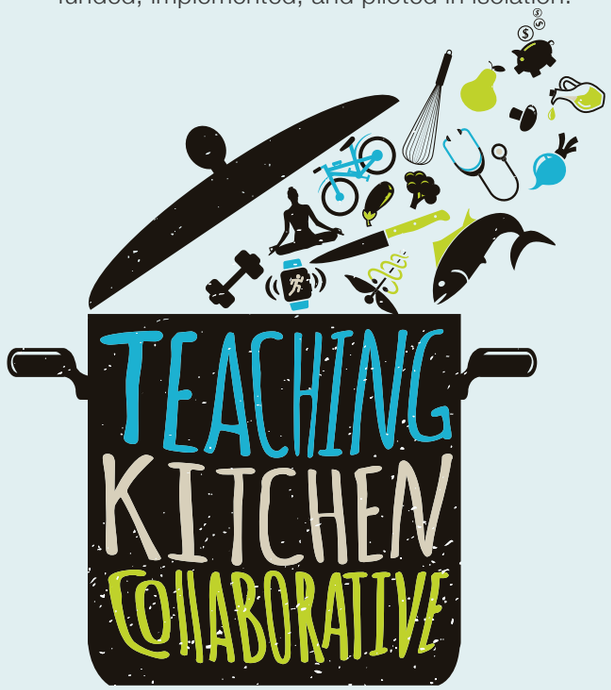
WHAT TO DO ABOUT IT?

Chefs, foodservice leaders, and cooking schools should explore opportunities to work with hospitals, health systems, medical/nursing/dietetic training programs, K-12 schools, colleges and universities, and corporations that are building and refining teaching kitchen curricula and facilities design, in order to train employees, patients, and adults, kids, and families in their communities. Conversely, schools of public health, medicine, and allied health and policy professionals should consider partnerships with foodservice companies and trained chefs to develop novel curricula and programs for those they serve. Healthcare professionals—and their certification boards—should explore ways to incorporate knowledge about the translation of nutrition science into practical advice for patients. Ultimately, research networks, such as the one being developed by the CIA-Harvard Chan School Teaching Kitchen Collaborative, can plan and implement formal demonstration projects to assess the impact of these medical-culinary educational alliances. The establishment and expansion of the TKC has set the stage for this next phase of activity.

TEACHING KITCHEN COLLABORATIVE: ADVANCING PERSONAL AND PUBLIC HEALTH THROUGH CULINARY LITERACY AND INTEGRATIVE LIFESTYLE TRANSFORMATION

Over the past year, The Culinary Institute of America and Harvard T.H. Chan School of Public Health have brought together 32 thought-leading organizations across 15 states as well as from Europe and Japan in formation of the Teaching Kitchen Collaborative (TKC). The vision is to use teaching kitchen facilities as catalysts of enhanced personal and public health.

The collaborative grew out of the Healthy Kitchens, Healthy Lives® (HKHL) conference (healthykitchens.org), which provides healthcare professionals with both didactic and experiential learning in nutrition, healthy cooking, exercise and movement, mindfulness, and health coaching. Offered 13 times since 2006 and attended by more than 6,000 registrants in total, HKHL has naturally turned into an incubator for early adopters and architects of teaching kitchens in various institutional settings used for health promotion. However, these facilities and their respective curricula are largely being funded, implemented, and piloted in isolation.



By collecting and sharing information across organizations, populations, and geographic areas, the TKC functions as an accelerator to support the development and evaluation of emerging teaching kitchen models and educational programs. The collaborative focuses on three specific areas: research, best practices, and scalability.

Co-chaired by David Eisenberg (director of culinary nutrition at Harvard Chan School) and Greg Drescher (CIA's vice president for strategic initiatives and industry leadership) with coordination from Allison Righter (nutrition instructor at CIA's Hyde Park campus), the TKC is supported by generous philanthropic support from several foundations, with additional support provided by member-grantors. Member organizations include community-based organizations, such as LA Kitchen and the YMCA of Pittsburgh, and primarily academic and/or medical institutions, such as Cleveland Clinic, Kaiser Permanente San Francisco Medical Center, Princeton, Stanford, University of California (Berkeley, Los Angeles, San Diego, and San Francisco), Vanderbilt, and others. A full overview and organizational roster can be found at the TKC website, tkcollaborative.org.

The TKC meets twice a year at different member organization sites, while collaborating on a regular basis through virtual working group meetings that develop resources that can be used both internally among members and externally with individuals and organizations across the country.

This recently-launched initiative marks a tremendous step forward in establishing strong medical-culinary partnerships and driving the use of teaching kitchens for improved public health.

Building on its long-running annual conference to advance culinary-driven, healthier foods for K-12 students, in 2015 The Culinary Institute of America launched the Healthy Kids Collaborative (HKC): a year-round, invitational initiative designed to both accelerate innovation and deepen technical and professional expertise in K-12 school food. It brings together leading school nutrition directors, school chefs, suppliers, and other stakeholders to discover flavor and menu strategies, highlight successes and best practices, and develop training protocols and resources. The goal is to share the insights and solutions gained with school districts across the United States.

School nutrition has shifted significantly in recent years from a "heat-and-serve" or "pass-through" operation to more onsite food preparation. This brings challenges related to staff training and equipment needs. Other challenges include the many factors that influence the school nutrition environment, which has a discernible impact on the amount of food students consume. Factors include the amount of time students have to eat, whether recess is held before or after lunch, the level of engagement among staff, and facility design. Along with these challenges also come numerous opportunities. For instance, research has confirmed that chef-enhanced school meals increase the selection and consumption of vegetables. Chefs can increase the palatability of foods served to children and, as a result, their consumption of healthier foods.

Aiming to address these challenges and opportunities, the second annual Healthy Kids Collaborative meeting was held in December. It welcomed nearly 75 corporate members and school nutrition members including chefs and directors from Sodexo, Chartwells, Revolution Foods, Minneapolis Public Schools, Metro Nashville Public Schools, Detroit Public Schools, and many others. Highlights of the meeting included a team-building kitchen activity where members explored an interactive flavor discovery that inspired new menu concepts, a demonstration on traditional clay-pot cookery and several "school-ified" versions of dishes, and an in-depth look at who the Gen Z customer is, with insights on the food trends that drive their selections. The collaborative's four working groups—staff culinary education and training, flavor development and sodium reduction, school culinary environment, and food and nutrition quality—shared progress and set goals for the year ahead to develop resources and practical solutions.

HEALTHY KIDS COLLABORATIVE: ACCELERATING INNOVATION AND DEEPENING EXPERTISE IN K-12 SCHOOL FOOD

HEALTHY MENUS R&D COLLABORATIVE: WORKING TOGETHER TO TRANSFORM MENUS IN THE VOLUME FOODSERVICE INDUSTRY

The Culinary Institute of America Healthy Menus R&D Collaborative, established in 2010, is a working group of volume foodservice culinary and nutrition leaders who are committed to providing a greater variety of healthful food and beverage options for American diners.

Members include 40 operator members, leaders from our nation's top foodservice operations, and 20 corporate members, representatives from like-minded food companies and commodity boards.

The collaborative grew out of the Worlds of Healthy Flavors invitational leadership retreat, held each January in partnership with Harvard T.H. Chan School of Public Health. The retreat provides a forum for nutrition experts and foodservice leaders to discuss best practices for expanding healthy menu options in the U.S., along with the most current contextual factors.

The collaborative includes representation from 7-Eleven, Aramark, AVI Foodsystems, Black Angus Steakhouse, Brinker, Compass, Chick-fil-A, Cracker Barrel, Dunkin' Brands, Harvard University Dining Services, Panda Restaurant Group, Panera Bread, Pollo Tropical, Ruby Tuesday, Sodexo, Sonic Drive-In, Subway, Taco Bell, The Wendy's Company, and Yale University Dining. The co-chairs of the initiative are Deanne Brandstetter, MBA, RD, CDN, vice president of nutrition and health for Compass Group; Pam Smith, RDN, founder and president of Shaping America's Plate; and Tom Gumpel, vice president of R&D for Panera Bread. Collectively, operator members feed over 100 million Americans every day. This means that even very small changes can have a tremendous impact on public health.

Leadership and guidance from Menus of Change has had and will continue to have a significant influence on the work of the collaborative, as members pursue their mission: "collaboratively engaging with foodservice industry leaders, resource specialists, manufacturers, and other suppliers to identify and explore non-proprietary culinary insights, applications, strategies, and solutions that can help chain restaurants and other large volume foodservice providers fulfill our customers' desire for delicious and nutritious menu choices."

A recent strategic planning process led members to disband old working groups and form five new working groups that address current trends and opportunities:

- Plant-Forward: This group will develop culinary strategies and solutions for offering more plant-forward foods on menus that customers crave.
- Process and Ingredient Purity: The group will be a collective voice for best practices and strategies for "clean" labels in foodservice.
- Protein Quality: This group will use consumer insights to define three or four major platforms focused on quality animal, marine, and plant protein.
- Promotion: This group will collect and promote best practices, goals, and initiatives of HMC member companies to both internal and external stakeholders and influencers, including policy makers.
- Policy: This group will provide members with updates on pending and current local, state, and national policies that may impact the foodservice industry in both positive and negative ways.

The future work of HMC members is clearly focused on their single-minded goal of finding practical solutions that help expand the availability and sales of healthy menu choices.

BETTERING OUR FOOD CHOICES AND OUR FOOD SYSTEM: INSPIRATION FROM THE MENUS OF CHANGE UNIVERSITY RESEARCH COLLABORATIVE

To accelerate the move among American consumers—in particular college students, faculty, and staff—towards healthier, more sustainable, plant-forward diets, The Culinary Institute of America and Stanford University have partnered over the past few years in leading the Menus of Change University Research Collaborative (MCURC). The collaborative brings together campus executive chefs and foodservice directors, leaders in university administration and business, and academic faculty in relevant disciplines to collaborate on research and education in support of culinary-centric, evidence-based food system innovation within and beyond universities. The collaborative also works with registered dietitians and sustainable food program managers on member institutions' dining teams in support of research projects and development of educational resources.

With representation from 44 colleges and universities, membership ranges from Ivy League schools to large state universities, along with supporting ex officio membership from select organizations outside of higher education. Sponsorship support comes from a variety of manufacturers that are industry leaders in addressing health and environmental issues. MCURC members work to leverage the unique opportunities in the higher education sector for advancing culinary literacy and nudging young adults towards healthier, more sustainable food and lifestyle choices. They also work on interdisciplinary, food systems-level research, including the use of campus dining facilities as living laboratories to test strategies for behavior change.

For a full overview of the initiative as well as a complete list and detailed profiles of the member institutions and sponsor organizations involved, please visit ***moccollaborative.org***

Thus far, the research arm of the collaborative has dedicated its energy to three specific areas of inquiry: food waste, values-based purchasing metrics, and reimagining the role of animal and plant proteins on menus. In the first half of 2017, the first multi-site research project was carried out at five campuses. The initial pilot project studied consumer preferences related to meat-mushroom blended burgers; and in the second half of 2017 MCURC researchers will be looking at rapid iterations of the blended burger experimental model, as well as two new projects, one on the types of menu language that are most effective for getting diners to eat vegetables, and another, on definitions for a food literacy metric that can be used to assess baseline levels throughout colleges and universities, and ultimately to measure potential increases in food literacy in response to MCURC efforts taking place in dining halls nationwide. All MCURC insights and research updates can be found on the MCURC website.

On the education side, the MCURC website provides individuals within and beyond the college and university sector with a rich library of resources for implementing Menus of Change principles. The resources are free and available for anyone to download. They include: a principle-by-principle gap analysis/self-assessment tool, a monthly marketing template for educating campus communities about health and sustainability issues, a chef-driven compilation of best practices and shared challenges on a principle-by-principle basis, Protein Flip menu strategies, and much more.

Since its inception, MCURC has held two annual all-member summits and presented its work at a half-dozen conferences throughout the country. Over the past year, collaborative leaders put forth a call to action for the college and university sector at large. First announced at the July 2016 national conference of the National Association of College and University Food Service (NACUFS), it's called "the MCURC NACUFS Challenge." The challenge has inspired countless campus dining professionals to advance plant-forward menus—by increasing plant protein purchases by 10 percent, increasing fruit and vegetable purchases by 10 percent, and reducing red meat purchases by 10 percent—and engaging faculty members on their campuses—by inviting faculty to present research in their dining halls, convening a student-faculty-dining roundtable, and launching an all-campus food symposium focused on health, sustainability, and food ethics.

Collectively, collaborative members serve over 650,000 meals every day. Given the enormous potential for collective impact, the collaborative has been continuously measuring adoption of Menus of Change principles throughout its members' campus dining operations. In turn, the year-round leadership by the MCURC around research and education is helping to advance a food system that supports better health for both humans and the environment.

OUR APPROACH: DIVERSITY OF STRATEGIES

Any approach to providing guidance on nutrition, the environment, and culinary insight to business leaders must recognize that America's $780 billion foodservice industry is as diverse as it is large and omnipresent in our culture. Customers, quite apart from their interest in health, sustainability, or food ethics, look to different kinds of operations to fill a variety of needs and interests. Appetites and preferences vary, depending on whether the meal is a workplace lunch, a mid-week dinner with the family, a snack on the run, or a celebratory occasion. What a diner or a family chooses to eat and order in a single instance is less important for their health and the environment than the aggregate pattern over days and weeks. Chefs and the foodservice industry have an enormous opportunity to embrace change, while still preserving a wide range of options for an American public that often wants someone else to do the cooking. These principles and strategies, together with the *Menus of Change Annual Report*, are intended to support innovation on the part of operators and entrepreneurs wherever they are positioned in the industry, and help connect them with their aspirations and their unique views of imperatives and opportunities.

IX. PRINCIPLES OF HEALTHY, SUSTAINABLE MENUS

Consumers say they want food that is healthy, sustainable, and ethically sourced, but figuring out which foods to eat is often not easy. As a result, the dining public is looking to chefs and food industry leaders to help them make the "right" choices. Culinary professionals are responding. But giving people what they want isn't always easy either. Some diners believe that foods advertised as "farm to table" or certified with sustainability labels are also healthier. While customers don't always purchase what they say they want, these trends are profoundly changing the landscape of the foodservice business.

The **Principles of Healthy, Sustainable Menus** represent unique guidance for the foodservice industry. They incorporate findings from nutrition and environmental science perspectives on optimal food choices, trends in consumer preferences, and impacts of projected demographic shifts in order to provide culinary insight and menu strategies that build on promising innovation already occurring in the sector.

The principles anticipate that fast-moving, mid- and long-term global trends—from continued population growth and increasing resource shortages to commodity price spikes and food security issues—will increasingly reframe how we think about food and foodservice in the United States. They also consider that the rise in diet-related chronic diseases suggests that many of today's food and foodservice business models cannot remain unchanged for the long term. They outline pivotal culinary strategies designed to increase the odds that customers will reward pioneering and innovative restaurants and other industry operations with their business.

In short, the Menus of Change Principles offer a guide to optimal menu design and innovations for future culinary development to promote the foodservice industry's abundant creativity and entrepreneurial dynamism in support of a future of tremendous opportunity.

Collectively, these principles and strategies also speak to our most vulnerable members of society. Chefs who are inspired by the possibility of delicious, healthy, and sustainable foods are working to make these flavors more accessible across America, in K-12 schools, in hospitals, and in low-income neighborhoods. Without the benefit of culinary expertise and insight, a focus on inexpensive ingredients can often be a recipe for failure, whether the customer is a child or an adult, middle-class or economically disadvantaged, healthy or sick.

Finally, the Menus of Change Principles have not been chiseled in stone; rather, they are designed to be part of an interactive, cooperative, and evolving process. As science progresses, trends shift, and new opportunities and challenges come to light, we will revisit and revise this document annually. Please join the conversation at the annual Menus of Change Leadership Summit or online to help us further strengthen this essential guidance for the foodservice sector. You can reach us at **info@menusofchange.org**.

For additional guidance on sustainability and nutrition science-based dietary advice, consult the CIA-Harvard Chan School Menus of Change website, **menusofchange.org**, and Harvard Chan School's Nutrition Source website, **nutritionsource.org**, which includes additional CIA-Harvard Chan School integrated dietary information and culinary strategies.

PRINCIPLES
OF HEALTHY, SUSTAINABLE MENUS

MENUS of CHANGE®
The Business of Healthy, Sustainable, Delicious Food Choices

The Culinary Institute of America | Harvard T.H. Chan School of Public Health, Department of Nutrition

BE TRANSPARENT ABOUT SOURCING AND PREPARATION

BUY Fresh AND SEASONAL, LOCAL AND GLOBAL

REWARD BETTER AGRICULTURAL PRACTICES

LEVERAGE GLOBALLY INSPIRED, PLANT-BASED CULINARY STRATEGIES

FOCUS ON WHOLE, MINIMALLY PROCESSED FOODS

GROW EVERYDAY OPTIONS,
WHILE HONORING SPECIAL OCCASION TRADITIONS

CELEBRATE CULTURAL DIVERSITY & DISCOVERY

LEAD WITH MENU MESSAGING AROUND FLAVOR

REDUCE PORTIONS, EMPHASIZING CALORIE QUALITY OVER QUANTITY

DESIGN HEALTH AND SUSTAINABILITY INTO OPERATIONS AND DINING SPACES

THINK PRODUCE FIRST

MAKE WHOLE, INTACT GRAINS THE NEW NORM

LIMIT POTATOES

MOVE LEGUMES AND NUTS TO THE CENTER OF THE PLATE

CHOOSE HEALTHIER OILS

REIMAGINE DAIRY IN A SUPPORTING ROLE

GO "GOOD FAT," NOT "LOW FAT"

SERVE MORE KINDS OF SEAFOOD, MORE OFTEN

USE POULTRY AND EGGS IN MODERATION

REDUCE ADDED SUGAR

SERVE LESS RED MEAT, LESS OFTEN

CUT THE SALT;
RETHINK FLAVOR DEVELOPMENT FROM THE GROUND UP

SUBSTANTIALLY REDUCE SUGARY BEVERAGES; INNOVATE REPLACEMENTS

DRINK HEALTHY:
FROM WATER, COFFEE, AND TEA TO, WITH CAVEATS, BEVERAGE ALCOHOL

MENU CONCEPTS AND GENERAL OPERATIONS

FOODS AND INGREDIENTS

DESIGNED BY J WRIGHT DESIGN

See the full version of the principles at www.menusofchange.org/principles-resources/moc-principles/

PRINCIPLES
OF HEALTHY, SUSTAINABLE MENUS

MENU CONCEPTS AND GENERAL OPERATIONS

1. Be transparent about sourcing and preparation. Providing customers with abundant information about food production methods, sourcing strategies, calorie and nutrient values, labor practices, animal welfare, and environmental impacts is a necessity in our technology-driven and networked era. Consumer engagement is driven by the rise in food safety and fraud alerts, a growing interest in sustainability and food ethics, and a hyper-connectivity that yields instant access to information such as impending crop failures or the latest farm-labor conditions across global supply chains. Consumers can learn about what they eat regardless of what chefs and businesses share. Given that, food operators can build trust by learning about environmental and social issues in the food system and sharing information about their own practices. Identifying the farms that grow key ingredients, for example, is a strategy that creates value and brand identity and one that is quickly becoming a standard practice. Going further and explaining how food is produced and the rationale for sourcing decisions are the next steps, while limiting or restricting information on hot-button consumer issues such as calories, trans fats, genetically modified ingredients, or processing methods are approaches not likely to survive over the long term. Operators who do not adjust business models and strategies to anticipate the impacts of this accelerating trend risk disappointing the dining public and having to play costly catch-up as such issues assume greater urgency with the public.

2. Buy fresh and seasonal, local and global. For chefs, peak-of-season fruits and vegetables can help create unbeatable flavors—and marketing opportunities. When designing menus, draw ideas and inspiration from local farmers and their crops during your growing season as well as the varieties and growing seasons of more distant regions. The advantages of local sourcing include working with smaller producers who may be more willing to experiment with varieties that bring interest and greater flavor to the table. A focus on local foods also can play an important role in building community by encouraging school children, retailers, media, and others to learn how to grow food, steward the land, and adopt healthier eating habits. But designing menus to draw on in-season fruits and vegetables from more distant farms also is a key strategy for bringing fresh flavors to menus throughout the year.

3. Reward better agricultural practices. Sourcing sustainably grown foods is complex, but there is one important rule of thumb: the environmental cost of food is largely determined by how it is produced. The best farms and ranches protect and restore natural systems through effective management practices, such as choosing crops well-suited for their local growing conditions, minimizing use of synthetic pesticides and fertilizers, and avoiding the use of groundwater for irrigation. Better-managed farms sometimes qualify for organic or other sustainable-farming certifications. But many—including smaller farms—simply adopt better practices. The most powerful strategies for supporting better farms include aligning menus to emphasize fresh foods during the peak of their local growing season and shifting purchases toward farms that have responsible management programs.

4. Leverage globally inspired, plant-based culinary strategies. Scientific research suggests that the most effective way to help diners make healthy, sustainable food choices is to shift our collective diets to mostly plant-based foods. Growing plants for food generally has less of a negative impact on the environment than raising livestock, as livestock have to eat lots of plants to produce a smaller amount of food. In fact, no other single decision in the professional kitchen—or in the boardrooms of foodservice companies—can compare in terms of the benefits of advancing global environmental sustainability. From the well-researched Mediterranean diet to the cuisines of Asia and Latin America, traditional food cultures offer a myriad of flavor strategies to support innovation around healthy, delicious, even craveable cooking that rebalances ratios between foods from animal and plant sources.

5. Focus on whole, minimally processed foods. In general, consumers and chefs should first focus on whole, minimally processed foods. Such foods are typically higher in micronutrient value and less likely to contain high levels of added sugars, saturated or trans fats, and sodium. (Indeed, nearly three-quarters of the sodium in the U.S. food supply is estimated to come from processed foods.) Whole, minimally processed foods are also typically slowly metabolized, preventing sharp increases in blood sugar that over time may lead to insulin resistance. That said, some minimally processed foods—low-sodium tomato paste, wine, nut butters, frozen fruits and vegetables, mayonnaise, dark chocolate, canned low-sodium beans, 100 percent whole-grain crackers, fresh-cut vegetables, spice mixtures, yogurt, reduced sodium sauces, many kinds of canned fish and shellfish, among other things—can be incorporated into healthy meals. Processing can also be used to extend the season of local and sustainably grown produce and to make use of cosmetically imperfect foods, especially produce.

6. Grow everyday options, while honoring special occasion traditions. The foodservice industry historically developed around special occasion dining. Today's industry, however, is increasingly responsible for providing everyday food choices to a substantial segment of the U.S. population. From a health and environmental perspective, there will always be room in the industry for indulgence and special occasion foods. However, the real opportunity in menu and concept development is the expansion of everyday food and menu choices that embrace current nutrition and environmental science, as well as emerging consumer values about how food is produced.

7. Lead with menu messaging around flavor. To sell healthy and sustainable food choices, lead with messages about flavor, rather than actively marketing health attributes. Research shows that taste trumps nearly all, even if customers want chefs, on some level, to help them avoid foods that increase their risk of chronic disease. Messages that chefs care and are paying attention to how and from whom they are sourcing their ingredients—such as by naming specific farms and growing practices (e.g., organic)—can enhance perceptions of healthier food choices (if, in fact, these choices are healthier—i.e., that they are also consistent with guidance for optimal nutrition).

8. Reduce portions, emphasizing calorie quality over quantity. Moderating portion size is one of the biggest steps foodservice operators can take towards reversing obesity trends and reducing food waste. This is different than offering multiple portion sizes, as many diners "trade up" to bigger portions, which they see as offering greater value. Consider menu concepts that change the value proposition for customers from an overemphasis on quantity to a focus on flavor, nutrient quality, culinary adventure, new menu formats, and the total culinary and dining experience (thereby mitigating potential downward pressure on check averages). Calorie quality is also important. Dishes should feature slowly metabolized whole grains, plant proteins including nuts and legumes, and healthy oils that promote lasting satiety and create great flavors.

9. Celebrate cultural diversity and discovery. Our respect for cultural diversity and the savoring and preservation of family traditions and centuries-old food cultures are as vital as our public health and environmental sustainability. Fortunately, these imperatives are compatible with the Principles of Healthy, Sustainable Menus. Chefs collaborating with nutrition experts and public policy leaders need to reimagine the role of less healthy, culturally based food traditions by limiting portion size, rebalancing ingredient proportions, or offering them less often. At the same time, many chefs are reporting greater success from introducing new, healthier and more sustainable menu items instead of reconfiguring existing items. Emerging demographic changes and greater global connectivity are making the American palate more adventurous, giving foodservice leaders a long-term opportunity for creative menu R & D.

10. Design health and sustainability into operations and dining spaces. Food and menu design are not the only ways to advance sustainability in foodservice. Choices that affect the way restaurants and other foodservice operations are designed, built, and operated are also important. These include imagining kitchens that support the optimal preparation of fresh, healthy foods and selecting energy- and water-efficient equipment and environmentally friendly building materials. As behavioral economics studies have shown, dining-room operations and foodservice eating spaces also deserve more attention: design, set-up, service, and communication strategies can all lead consumers towards healthier, more sustainable choices.

PRINCIPLES
OF HEALTHY, SUSTAINABLE MENUS

FOODS AND INGREDIENTS

1. Think produce first. Focus on fruits and vegetables first—with great diversity across all meals and snacks. Recognize that customers aren't eating nearly enough—they should be filling half their plates with produce. Menus should feature green leafy vegetables and a mix of colorful fruits and vegetables daily. Fruit is best consumed whole or cut, fresh and in season, or frozen and preserved without added sugar or salt. Fruit juice often contains healthy micronutrients, but it also packs a large amount of fast-metabolizing sugar and should be limited to one small glass per day. Dried, unsweetened fruit is also a good choice; though it contains natural sugars, it also contains fiber, which can mitigate negative blood sugar response.

2. Make whole, intact grains the new norm. Menus should offer and highlight slow-metabolizing, whole and intact grains, such as 100 percent whole-grain bread, brown rice, and whole grain/higher protein pasta. Use white flour and other refined carbohydrates sparingly, as their impacts on health are similar to those of sugar and saturated fats. Ideally, new menu items should emphasize whole, intact, or cut—not milled—cooked grains, from wheat berries and oats to quinoa, which can be used creatively in salads, soups, side dishes, breakfast dishes, and more. In baking, blend milled whole grains with intact or cut whole grains to achieve good results.

3. Limit potatoes. Potatoes have rapid metabolizing impacts on blood sugar, which is of special concern as they are regularly used as a starch to fill plates. Chefs can limit their use of potatoes by combining small portions of them with other, non-starchy vegetables or featuring them as an occasional vegetable, as they do green beans, broccoli, carrots, and peppers. Chefs should also consider healthier alternatives including sweet potatoes, which are rich in beta-carotene and other vitamins, and healthier side dishes that highlight fruits, vegetables, whole grains, legumes, and nuts.

4. Move nuts and legumes to the center of the plate. Nuts and legumes are full of flavor, contain plant protein, and are associated with increased satiety. Nuts contain beneficial fats, while legume crops contain fiber and slowly metabolized carbohydrates. Legumes also are renowned for helping to replace nitrogen in the soil and produce impressive quantities of protein per acre. Nuts (including nut butters, flours, and milks) and legumes (including soy foods and legume flours) are an excellent replacement for animal protein. They also are a marketable way to serve and leverage smaller amounts of meat and animal proteins.

5. Choose healthier oils. Using plant oils and other ingredients that contain unsaturated fats, such as canola, soy, peanut, and olive oils, as well as featuring fish, nuts, seeds, avocados, and whole grains, are simple ways to create healthier menus. Research shows that reducing saturated fat is good for health if replaced with "good" fats, especially polyunsaturated fats, instead of refined carbohydrates such as white bread, white rice, mashed potatoes, and sugary drinks. High-flavor fats and oils that contain more saturated fat—including butter, cream, lard, and coconut oil—can have a place in healthy cooking if used only occasionally in limited, strategic applications. Trans fats from partially hydrogenated vegetable oils, now labeled a "metabolic poison" by leading medical scientists, have no place in foodservice kitchens.

6. Go "good fat," not "low fat." Current nutrition science reverses the mistaken belief that we need to limit all fat. Moderate and even high levels of beneficial fats in the diet—from (most) non-hydrogenated plant oils, nuts, nut butters, avocados, and fish—are associated with optimal nutrition and healthy weight. Beneficial fats paired with an abundance of vegetables, whole grains, legumes, and nuts can give our diets a baseline of slow-metabolizing, healthy foods, which are associated with increased satiety. A more liberal usage of healthy fats, offering the potential to deliver high-impact flavors, might represent the difference between consumers liking—or not liking—healthier and more environmentally friendly foods. Even small, occasional servings of deep-fried foods and condiments are appropriate offerings if operators use healthy, non-hydrogenated oils, and avoid potatoes, breading, and other refined carbohydrates in favor of fish, vegetables, legumes, and legume flour. Research confirms that the vast majority of people report better adherence to a moderate- or higher-fat, healthy diet.

7. Serve more kinds of seafood, more often. Seafood is an important part of a healthy diet, and most Americans don't eat the recommended one to two servings per week of fatty fish, which contain higher levels of health-promoting omega-3s. However, the focus on just a few species is emptying parts of the oceans of popular types of seafood such as cod and tuna and now also fish like menhaden that are a key ingredient in feed for some types of farm-raised fish. Scientific studies have found that the benefits of eating seafood greatly outweigh the risks and that removing or reducing seafood from the diet can have negative effects on health. Serving more seafood more often from responsibly managed sources is the priority. Chefs can have a positive impact on the environment and public health by expanding their understanding of how to source and use a greater variety of responsibly managed and underutilized wild-caught and farm-raised fish and shellfish.

8. Reimagine dairy in a supporting role. While there is tremendous innovation underway to improve dairy production and its impact on the environment, the nutrition science on dairy is still unsettled and evolving. Current research suggests that it seems prudent for individuals to limit milk and dairy to one to two servings per day. Chefs should leverage the flavor of cheese (high in saturated fat and sodium) in smaller amounts and minimize the use of butter. Yogurt (without added sugar) is a good choice for professional kitchens, as its consumption is associated with healthy weight.

9. Use poultry and eggs in moderation. Chicken and other poultry in moderation is a good choice for healthier protein with a far lower environmental footprint than red meat. Chefs should avoid or minimize the use of processed poultry products, which are high in sodium, often as a result of sodium pumps and brining. Eggs in moderation—an average of one per day—can be part of a healthy diet for most people. Creative menu items that mix whole eggs and egg whites for omelets, and eggs with vegetables, are ideal.

10. Serve less red meat, less often. Red meat—beef, pork, and lamb—can be enjoyed occasionally and in small amounts. Current guidance from nutrition research recommends consuming a maximum of two 3-ounce servings per week. Chefs and menu developers can rethink how meat is used by featuring it in smaller, supporting roles to healthier plant-based choices, and experimenting with meat as a condiment. From at least some environmental perspectives (e.g., GHGE, feed efficiency ratio), pork is the better choice among red meats (though not distinguishable from a nutritional perspective). Saturated fat is one health concern associated with red-meat consumption, but it's not the only issue. Chefs should strive to limit bacon and other processed and cured meats, which are associated with even higher incidence of chronic disease than unprocessed red meats. Many diners choose to splurge on red meat when they eat out, and there will always be an appropriate place for meat-centered dishes. But chefs can help to shift eating patterns by building a sense of theater and value in menu concepts that don't rely so heavily on a starring role for animal protein. For example, they might offer delicious meat/vegetable and meat/legume blends, or smaller tasting portions of red meat as part of vegetable-rich, small-plate formats.

11. Reduce added sugar. Consumers crave sugar, and the foodservice industry responds by selling processed foods and sweets that are loaded with it. But sugar's role in spiking blood-sugar levels and increasing rates of type 2 diabetes and other chronic diseases means that professional kitchens should substantially restrict its use. Various strategies include: choosing processed foods with little or no added sugar; favoring healthy oils over sugar in products such as salad dressings; featuring smaller portions of dessert augmented with fruit; and substituting whole, cut, and dried fruit for sugar in recipes. There is nothing wrong with an occasional dessert; but pastry chefs and dessert specialists need to take up the challenge to create sweets centered on whole grains, nuts, dark chocolate, coffee, fruit, healthy oils, yogurt, small amounts of other low-fat dairy and eggs, and, as appropriate, small amounts of beverage alcohol—with the addition of only small to minimal amounts of sugar and refined carbohydrates.

12. Cut the salt; rethink flavor development from the ground up. The foodservice and food-manufacturing sectors have long been too reliant on salt to do the heavy lifting to create high flavor impact and customer satisfaction. Single items, such as a sandwich or entrée, might contain more than 2,500 milligrams of sodium, well above the current maximum recommended intake of 1,500 milligrams to 2,300 milligrams for the entire day. Chefs should focus on a range of other strategies to deliver flavor including: sourcing the best-quality, high-flavor produce; working with spices, herbs, citrus, and other aromatics; and employing healthy sauces, seasonings, and other flavor-building techniques from around the world. Many chefs are finding success in focusing their innovation where they have the highest aggregation of sodium (e.g., processed meats, cheese, and bread) in a single menu item. Others are making progress in implementing an across-the-board incremental 10 to 20 percent sodium reduction in their preparations. Still others are focusing on collaborating with manufacturing partners to reduce sodium using alternative strategies to create desired flavors and textures.

13. Substantially reduce sugary beverages; innovate replacements. A drastic reduction in sugary beverages represents one of the biggest opportunities for foodservice operators to help reverse the national obesity and diabetes epidemics. Sugary beverages add no nutritional value and contribute negligible satiety. Yet they are a prime source of extra calories in the diet and a principal contributor to the development of type 2 diabetes, heart disease, and other chronic conditions. Smaller portion sizes and less frequent consumption are steps in the right direction, but nowhere in foodservice is there a greater need of creative, "disruptive" innovation than in the challenge to replace current soda and sugary beverage formulations with more healthful options. Operators should diligently research, support, and promote the products of entrepreneurs and emerging and established brands that are rapidly developing beverage solutions in this important area. Diet sodas and other diet beverages, though lower in calories, may reinforce an aggregate preference for sweet flavors, potentially driving down the appeal of vegetables and other healthy foods. As such, they should be consumed in smaller portions less frequently.

14. Drink healthy: from water, coffee, and tea to, with caveats, beverage alcohol. Water is the best choice to serve your customers, either plain or with the addition of cut-up fruit, herbs and aromatics, or other natural flavors—but no sugar. Served plain, coffee and tea are calorie-free beverages containing antioxidants, flavonoids, and other biologically active substances that may be good for health. Wine, beer, and other beverage alcohol present a more complicated story of benefits for many individuals, with some offsetting risks. Current nutrition guidance suggests a maximum of two drinks per day for men, and one drink per day for women.

> “Do we want to teach 100 people to go vegan, or 100 million to go 70 percent plant-based?”
>
> *—Green Monday CEO and co-founder David Yeung*

X. CASE STUDIES: THE SELLING OF HEALTHY, SUSTAINABLE, DELICIOUS FOOD CHOICES

One of the unique contributions made by the 24 Principles of Healthy, Sustainable Menus is that they provide comprehensive guidance that integrates both environmental and public health imperatives. Operators who are inspired to act upon the principles often find value in focusing on just a few at once though, acknowledging that their efforts will evolve over time in order to eventually address all or at least many potential areas of improvement. The analyses and concrete examples provided in the following case studies are meant to inspire both the broad, all-encompassing pursuit of healthier, more sustainable food choices and to equip foodservice professionals to take action to address specific principles in deep and highly targeted ways.

The growing fast casual chain Modern Market, for instance, exemplifies the paired principles of “Lead with menu messages around flavor” and “Be transparent about sourcing and preparation”—all while ensuring an affordable price point. The global initiative Green Monday, for another, takes the torch of “Serve less red meat, less often” to new heights. All together, these case studies provide insights and strategies in four different spotlights: an emerging chain to watch, a groundbreaking investor framework, a compelling marketing approach, and the power of a good partnership.

EMERGING CHAIN SPOTLIGHT: MODERN MARKET

HOW TO MAKE HEALTHY, DELICIOUS FOOD ACCESSIBLE TO ALL

The standard business model for scratch cooking with high-quality ingredients involves passing on the costs to the diner by marking up the price of the item to compensate. But at Modern Market, they apply an engineer's concern for operational efficiency to the fast casual food experience. Why? To bring the price point down and make great tasting, healthy food options accessible to the masses.

Everyday Eating

As the Menus of Change initiative and other culinary leaders have pointed out, restaurants are no longer merely the places you go to celebrate a special occasion. They are places where people eat sometimes multiple times a week.

"The restaurant industry was built on the backs of indulgence, and no one looked at what happens for people eating at these places every day," says Modern Market co-founder and co-CEO, Anthony Pigliacampo. "Our view is: What would the restaurant of the future look like, where you're going to eat there a lot but you're not going to worry about it hurting you?"

He credits Chipotle with being among the first to fit those criteria, but he laments that it's just one cuisine type, so no one could eat there *every* day.

As an engineer, Pigliacampo used to be on the road a lot for work. He grew frustrated by noticing how the only options available for a quick bite outside the home made him feel awful afterward. "I love the analogy that it's like voting—you choose the least worst option," he says.

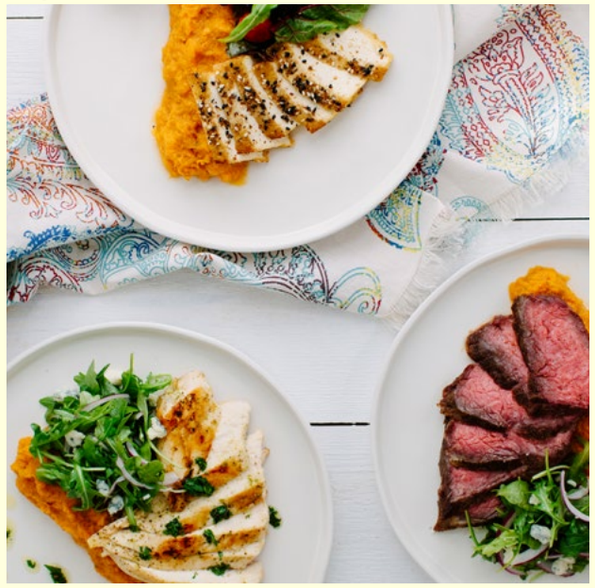
To make do during those years, he ended up eating at grocery stores, taking food back to eat in his hotel room. He became so frustrated by this situation that he decided to do something about it. With no culinary background or restaurant experience whatsoever, he and his co-founder, Robert McColgan, who was working at Goldman Sachs in New York at the time, started a fast casual restaurant chain.

Based in Boulder, CO, Modern Market serves simple American fare—soups, salads, sandwiches, and pizzas—with a plant-forward bent. They consider their menus healthy in that they're based on the way most people cook at home. Good home cooks shop the perimeter, and he felt that should be the case in restaurants, too. It's unlikely that consumers have a vat of xanthan gum on their counter, he explains, or a tin of MSG. So Modern Market sticks to "clean, whole foods."

Their Secret Sauce

Throughout the industry, many foodservice operators want to make the better raised, better grown, better tasting ingredients meet every diner's budget. But how can it be done? For starters, Modern Market leverages its scale, purchasing high-quality ingredients at fairly low prices. For this reason, rapid growth has always been their goal. Founded in 2009, the chain is currently at 24 units and expects to hit 40 by the end of 2018.

But their real point of differentiation is the precision of the operations on the back end. As an engineer, Pigliacampo was trained to optimize processes in order to achieve a certain objective. Entering the food arena, he found that what usually complicates operations is human error. For example, if a chef botches a step in a recipe, the entire dish usually gets tossed, driving up food costs. Instead, he and his team have found ways to minimize error and waste, to the point that they now run actual versus theoretical food costs (or variance from theoretical food costs) at 1.5 percent, a very low number for scratch cooking. By optimizing their processes, they know exactly how much antibiotic-free chicken goes on every sandwich, for instance, so they can calculate what the cost should be for those four ounces (which are relatively expensive), and keep the difference between the cost it ends up being as tight as possible. In applying that same precision to every high-quality ingredient that goes into the sandwich—scratch-made aiolis, for one, and bread that's only flour, olive oil, salt, yeast, and water—they manage to charge just $7 for ingredient and culinary quality that their competitors frequently charge $14 for, he says. That makes that higher quality sandwich affordable for a lot more people.



As Pigliacampo puts it: "The typical way is, 'Here's the rough recipe; go.' Our [approach] is down to the gram of every ingredient, and we are very specific about the tools for how to make [each item]. It's much more of a culinary science than a culinary art." That said, "It has to always look like art from the customer standpoint, but we have to put more rigor from behind the curtain to make it repeatable." To make the steps repeatable, they spent years breaking down cooking steps into many more sub-steps than other operations tend to use. They ask questions like, "If I'm cooking this protein on this combi oven and holding it this amount of time, what's the moisture loss and how does that influence the price?" So the low prices they pull off are the result of having asked those kinds of questions about every item in their order guide. It's the sum of a thousand small tweaks, through a process of continuous refinement. Most restaurants, he says, simply don't want to endure the hassle of that degree of operational exactitude.

Pigliacampo is adamant to emphasize that good food is never *cheap*. Instead, Modern Market's goal is to find the floor for how inexpensive the really high-quality food can be. He likens it to clothing. A $5 t-shirt at Target, he says, shouldn't exist, because it doesn't reflect the shirt's true costs. He is a strong believer that this rule applies to food: "There's no way to make a 99-cent chicken sandwich where the worker who made it is treated well because they're paid a living wage, where the environment is treated well because of how you sourced it, and the health of the person eating it is treated well because of what's in it."

By far the most difficult part of their journey as a company has been effectively communicating with all of the people working in their stores as they grow at such a rapid pace. "That's what we spend the bulk of our time and energy trying to solve," he says. "How fast we can develop people entirely. It's both the training—and communicating a culture among a rapidly growing team that's really geographically spread out—and a technical part like techniques and recipes."

His advice to any restaurateur or foodservice entrepreneur is to over-hire your support team and hire well in advance—a year or even two years ahead—of when new units open. Only then will you have enough time to bring everyone up to speed.

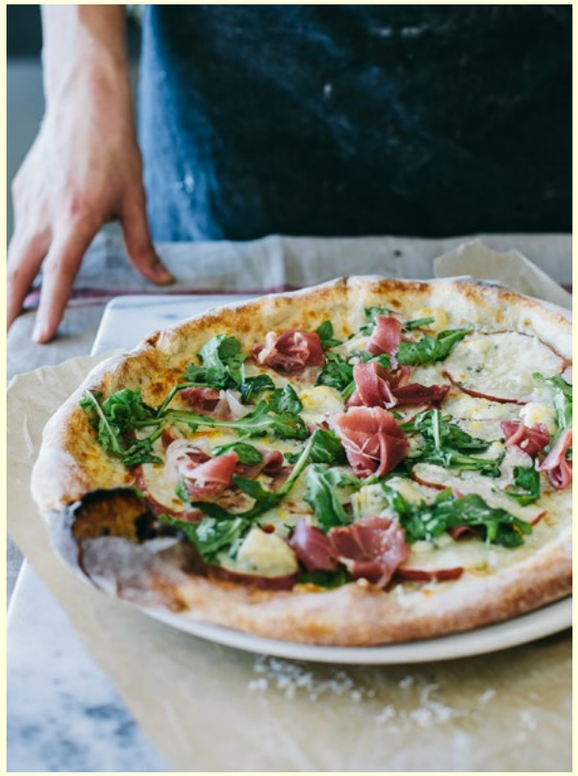
Simple Isn't Sexy

Another chief obstacle was convincing diners that Modern Market was offering what people truly wanted to eat. "It's fascinating how hard it is to communicate what we do," says Pigliacampo. "So many restaurants are just smoke and mirrors, but the food doesn't really deliver. We're the opposite of that. Simple, clean food isn't that sexy, but it's what people want."

Importantly, Modern Market doesn't position its food as being healthy. Instead, the design of the in-store experience evokes the ethos of the food itself: bright, modern, clean. An open kitchen in each unit provides a "trust pass" from the guests because they can see what's going into their meal. Their receipt shows the nutrition profile of the dish, and then, as soon as they taste the food, it connects all the dots.

Taste is paramount at Modern Market. So often, Pigliacampo notes, healthy food options don't taste good enough for people to want to eat them. One of their most successful strategies has been to start with humble and wholesome items like a salad and take them up a notch through grilled-to-order proteins, which they prepare at a large carving station. For diners, the experience of receiving a small, two- or four-ounce topping of hot, freshly prepared meat or tofu atop a simple bowl of fresh vegetables adds enormous appeal.

Who *wouldn't* want to eat that every day?



MARKETING SPOTLIGHT: GREEN MONDAY

"MAKE CHANGE HAPPEN. MAKE GREEN COMMON."

Simple. Viral. Actionable.
That's the mission of Green Monday, one of the most successful social change platforms advancing sustainable lifestyles on a global scale. Green Monday is a movement to promote and enable "low-carbon plant-based living." In 2014, *Fast Company* named it one of the 50 most innovative companies in China. It was founded in Hong Kong in 2012, and in just the last three years, the percentage of the seven million residents of Hong Kong who consider themselves "hard core meat lovers" has dropped by a third, from 27 percent of the population to 17 percent.

Green Monday is resonating far beyond its home base to 23 countries around the world—from Albania to South Korea, the United States to Indonesia—and it's precisely because of those three core strategies.

Simple
The name "Green Monday" was chosen with care. These two words are among the first that a child learns, in any culture, in any language. The founders realized that if there is one color that is universally accepted as pleasing, environmentally friendly, and natural, and evocative of health (by bringing to mind plants and vegetables), it's green.

The platform is intentionally positive and inclusive. "If we're going to create something we want everyone to be able to join, we're not going to use anything that has a blaming, shaming, or bashing connotation," says Green Monday CEO and co-founder David Yeung."You will get criticism before you get impact. To us, anyone who even takes a baby step, we celebrate it like crazy, because that baby step is when the door opens." In other words, it's about a gradual shift from green eating to green living—building a sense of awareness around environmentally friendly habits that people apply to other aspects of their lives, from recycling to wasting less food.

The concept is intended as the umbrella for both individuals and institutions to incorporate a whole range of activities under, from energy reduction to plant promotion. The city of Shenzhen, China, for example (whose population exceeds 10 million people), uses Green Monday to promote biking in addition to plant-based diets. "There is a lot of flexibility and scalability to the term of Green Monday, and we absolutely want to open source it. We aren't dictating the way people apply Green Monday. They don't use words like "meatless," but instead emphasize "green," "plant-centric," and "plant-based" food choices. The selling of climate-friendly diets, they find, works best if they don't use terms like "Climatarian," "Reducetarian," or other "-arians." Their aim is not to create tribes or narrowly defined identifiers, like "I am a ____," but rather to generate specific actions. So they opt for phrases with verbs, like "Go Green" or "Let's Green Monday," which spark a specific step to take, and a social one at that. (While they use the term "vegetarian," it's to identify menu options that don't contain meat. They aren't trying to turn people into self-declared vegetarians.)

Viral
The vernacular of Green Monday is part of the secret to their second core characteristic: "viral." People are likely to communicate their participation in the movement while in a social setting: At a table of friends out for dinner, one might say "I'm going green tonight," which might generate celebration from a fellow table mate, who may even choose to join that individual in the moment, creating a snowball effect. It happens at the institutional level as well: For example, when Standard Charter bank got on board, their executive leadership held a major press event to demonstrate buy-in from the top. That made other banks eager to join in. "People follow what other people are doing," says Yeung. "'You're wearing that brand, I want to wear that brand, too; you're doing yoga, I want to do yoga, too.' We are creating the peer environment among schools, corporations, and organizations."

"FOOD IS THE WAY IN BECAUSE EVERYBODY EATS. IT'S THE ANCHOR. BUT IT'S THE START, NOT THE END."

Actionable
Finally, their initiative is "actionable," offering three main ways that participants of Green Monday can act. The first is to create a routine: skipping meat one day a week, or one meal each day. The second is to reduce the proportional presence of meat in each meal: Suppose you're ordering five pizzas for a group of students in a dorm; you might stick with pepperoni for one, Hawaiian for one, and one with sausage and peppers, but opt for the other two pizzas to be veggie only, they say. And third is to focus on eliminating only the foods with the highest environmental impact: opting to not eat red meat at all, for instance, without going all the way vegetarian. They offer these three options because it lowers the point of entry for people, enabling everyone to "go Green Monday" in the way that is most comfortable to them.

As for Monday as opposed to another day, the other co-founder, who named Green Monday originally, hadn't even been aware of Meatless Monday, the initiative widely known in the US and the UK. Rather, as far as changing human behavior, intuitively Monday is symbolic of a fresh start. Plus, in Asia, Yeung says that few people have heard of Meatless Monday, so the concept is still a blank canvas.

Ultimately, their goal is for Green Monday to go far beyond Monday or even just one day. Yeung says: "People tell me, 'I don't even realize it but I'm greening four or five times a week!' That's the message I love to hear. Do you have to remind yourself to brush your teeth? No. It just becomes normal behavior. And that's when you've had real penetration."

The structure of the organization is different from most social change platforms. They have three arms, which work synergistically: advocacy, investment, and food distribution. Green Monday is the advocacy wing, and the only not-for-profit segment. Green Monday Ventures invests in companies developing innovative solutions and products to enable sustainable behaviors. And Green Common is their plant-based foods emporium, with both dining and retail, as well as their distribution arm to foodservice channels and supermarkets. Green Common is currently at four locations in Hong Kong but set to expand.

Green Monday works with thousands of foodservice operations at a wide range of corporations and educational institutions around the world. One of their most successful tactics is helping each participating operation tell the story of its impact. Green Monday provides a basic report about the percentage of meals over time that each operation is serving that are plants only, celebrating the carbon and water reduction of that organization's shift. Those figures can in turn be shared in annual reports and with stakeholders to demonstrate positive, measurable progress.

In the cafeteria setting of a participating operation, menu items will appear with the Green Monday logo beside them, and Green Monday ambassadors hand out pledge cards to diners. Pledge cards may also be displayed near the register, and large billboards and digital signs featuring celebrities are placed around the cafeteria. The signs are posted all the time, not just on Monday. One of their most prominent campaigns was a complete canvassing of the Hong Kong airport, which benefited the airport, Yeung points out, by positioning the city as helping to drive a major global sustainability movement.

Overall, their marketing approach has been extremely successful. But when has the Green Monday way backfired? When it was misinterpreted by an organization aiming to adopt its philosophy a bit too enthusiastically. The principal of a school in Hong Kong ignored Green Monday's guidance not to remove *all* the menu options containing meat. It turned out that the school's chefs had very little experience or know-how around cooking plant-based options, meaning the only options available tasted terrible. Students wound up talking to the media, telling them how much they hated the program. Yeung says it's the only organization of tens of thousands they have worked with globally that encountered resistance. From their experience, the optimal menu balance for those implementing Green Monday is 70 percent plants only, 30 percent containing meat.

"I'm not a believer of just black and white," Yeung adds."The [CIA's] blended burger project is very much aligned, because it's not about all or nothing. We don't have some hidden agenda to ultimately make everyone go vegan." Instead, it's about changing the *ratio* of how food is served. "Do we want to teach 100 people to go vegan, or 100 million to go 70 percent plant-based?"

INVESTOR SPOTLIGHT: FOOD SYSTEM 6

FINDING MARKET-BASED SOLUTIONS TO IMPROVE EQUITY, HEALTH, AND SUSTAINABILITY IN THE FOOD SYSTEM

In February 2014, the governor's office of California hosted a meeting welcoming investors, food industry veterans, and other stakeholders, to pose a pie-in-the-sky question: *How can we adapt the best practices of Silicon Valley around supporting innovation and entrepreneurship to have a direct impact on the health and sustainability of our food system?*

From that meeting was born an organization that today fills a novel role in the food innovation landscape. Food System 6 is a non-profit, impact-focused accelerator, backed by the Robert Wood Johnson Foundation, the William K. Bowes, Jr. Foundation, Susan Rockefeller, and John and Timi Sobrato.

Food System 6 is part investment bank, facilitating the flow of capital to select startup teams; part think tank, consulting for a wide range of partners on issues across the value chain; and part accelerator. It connects entrepreneurs with "the mentors, diverse networks, capital, capacity building and community perspectives needed to further prove their concept, build their ability to scale, and maximize their success," as its leadership wrote in the program for a forum they held earlier this year.

From October 2016 to February 2017, Food System 6 ran its first cohort of startups—nine teams, selected from over 70 applicants. This cohort included: Blue Farms Hawaii, an aquaponics farm working to alleviate stress on ocean fish stocks and the state's reliance on imported food; Emmer & Co, a heritage chicken producer based on regional production hubs and humane, environmentally positive practices; Equitable Food Initiative, a non-profit organization optimizing compliance with food safety standards in tandem with farmworker conditions; Tiny Farms, a company building scalable insect farms as an alternative for animal feed and fishmeal as well as a protein source for people; and PastureMap, a data-rich grazing management platform for ranchers to sequester carbon and boost soil health, land water holding capacity, and biodiversity.

Along with their unique perspective and organizational structure is their unique investment strategy. "We are a non-profit organization that has an investment thesis, so who we are in the ecosystem is a little destabilizing…in a healthy way," says Renske Lynde, co-founder and managing director of Food System 6.

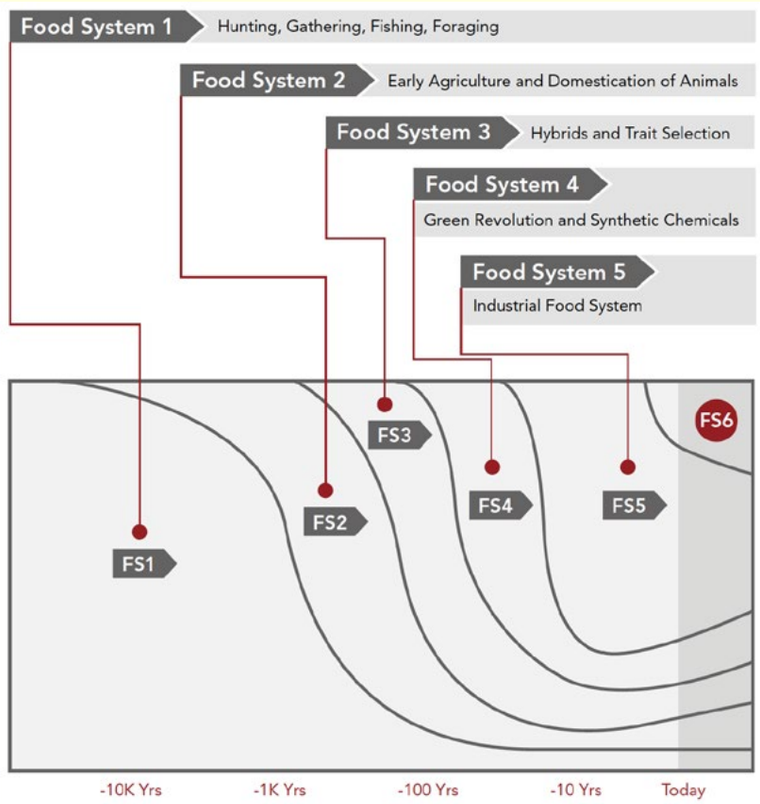
That thesis was informed by conversations with over 500 food system entrepreneurs, held across two years, to understand how to best lend value to entrepreneurs. From there, they developed three filters for selecting startups to support: They place equal weight on environmental health, social health, and physical health. It's a far more holistic approach to supporting new companies than is typical in the current investment arena.

"There is a lot of dialogue right now about whether food and ag tech will be the next bubble," says Lynde. "There is a huge market, and a significant need, for entrepreneurs to disrupt and improve our food systems. But the type of capital will need to look quite different from capital in other domains. The food system is incredibly complex, highly regulated, and heavily interconnected. Underlying that system are living beings. And growing cycles. Those [elements] just extend the need for earlier, more patient capital that is not bound by the traditional venture format."

Their investment theory centers around a "dynamic capital stack," also known as blended capital, collaborative capital, or layered capital, which all refer to a mix of types of capital that have different objectives. These range from venture capital and other investment funds to government, foundation, and university grants.

Food System 6's approach is informed by the accumulated wisdom in Silicon Valley for supporting entrepreneurs, yet aims to avoid the pitfalls of the instant gratification mantra. It's related to a new idea in the startups investor community, proposed in 2017 by James Joaquin of Obvious Ventures, which is called the World Positive Term Sheet. This is a new tool in the toolkit for capital providers who are impact-oriented. In a blog post unveiling the idea, Joaquin wrote, "let's add a page to the Term Sheet that codifies the core values of the company. We call this the World Positive Term Sheet ("WPTS"). The WPTS is not intended to affect the legal investment documents…Instead the purpose of the WPTS is to make sure investors and founders are aligned early on key values that will determine how company leadership makes both strategic and tactical decisions in the years to come."

As a think tank, one of Food System 6's most groundbreaking ideas is the one behind its name: the idea of the sixth iteration of our global food system. As you can see in the diagram below, Food System 1 through Food System 5 traces the evolution from hunting and gathering to the early domestication of animals, to selective breeding, the Green Revolution of mechanized farming and synthetic chemicals, through the industrial food system we currently inhabit, which is characterized by mass scale, standardization, and long supply chains. In the aspirational Food System 6, Lynde and her team envision incorporating many of the best elements of previous food systems, which they call "incremental improvements," along with new disruptions in technology and biology, energy and financial models, etc. Under the new system, the value chain is perceived as evolving toward more of a value *cycle*. Among other things, that value cycle is characterized by feedback loops such as turning waste into "upcycled," "value-added products," and by regenerative agricultural practices.



The sixth iteration of our global food system by Food System 6.

The buck doesn't stop there, though. Food System 6 is also a partner in developing an innovation pipeline of market-based food system solutions. Its leaders collaborate on research and nurturing innovative business ideas with corporate partners and academic faculty at universities, in addition to providing relevant expertise on business competitions.

Once Food System 6 has a few more cohorts under its belt, it will expand to the domain of influencing policy. "Our teams function as living laboratories about the trajectory of the food system, as many of them will bump into road blocks for scaling that are policy or regulatory in nature," Lynde says. "That database and repository will give us really good raw data to shape advocacy around."

In sum, what we know for sure about Food System 6 is that, in 2017, its approaches are rather unprecedented. What remains to be seen is if they wind up sparking a whole new modus operandi in the investor community at large.

PARTNERSHIP SPOTLIGHT: ARAMARK AND AMERICAN HEART ASSOCIATION

A GROUNDBREAKING PUBLIC-PRIVATE PARTNERSHIP WITH SHARED AMBITION FOR CHANGING THE MENU

Approaching the year 2020 can be a powerful rallying cry for many who work each day to shape a better future for human and environmental health.

In 2015, Aramark and American Heart Association (AHA) came together when they realized they shared not only goals to improve eating habits nationwide, but a motivation to make measurable change before 2020. For years, Aramark had been working on health and wellness, with an army of 750 dietitians and its Healthy for Life® program in place. AHA, for its part, had set an impact goal to boost the health of the American population by 20 percent while reducing deaths from cardiovascular disease and stroke by 20 percent by 2020. Thus was born Healthy for Life 20 By 20, a joint initiative to improve the health of all Americans 20 percent by 2020.

Over a five-year period through 2020, the initiative set out to reduce calories, saturated fat, and sodium levels 20 percent, and increase fruits, vegetables, and whole grains 20 percent. In addition to the healthy menu commitment across Aramark's businesses, Healthy for Life 20 By 20 includes community health engagement programs, consumer health awareness and education, as well as thought leadership, research, and health impact reporting.

As Aramark is one of the largest foodservice providers in the United States, these commitments stood to impact over two *billion* meals per year. Those meals are served across thousands of outlets and institutions, from sports arenas and entertainment venues to elementary schools, colleges, offices, hospitals, and beyond.

In November 2016, Aramark and AHA announced their first-year report, revealing major progress in reaching their goals: They had reached an eight-percent reduction in calories, sodium, and saturated fats across key menus, ahead of their three to five percent annual target. While more precise metrics for fruits, vegetables, and whole grains are under development, they reported that already they had reached 30 percent of main dishes being vegetarian or vegan, and 10 percent of main dishes containing whole grains as a leading ingredient.

What are the secrets to their success? How are they actually making these changes across such a vast network of operations and large number of menu items? And what have they learned along the journey so far?

Menu Strategies

In working toward these six targets, Aramark's culinary team tracks calories, saturated fat, sodium, and other ingredients at the individual recipe level, even seasonal menu items, through a propriety menu management system. During the second year of the partnership, they will be able to track fruit, vegetable, and whole grain composition at the levels of individual recipes, menu categories, and entire menus.

"From a culinary development point of view, having an impact across the many different types of locations that Aramark serves was one of the reasons it was exciting for me to be part of this," says Annette Gray, associate vice president of culinary innovation and development for Aramark. "Our chef team here has always developed our menu concepts with wellness in mind—well before it was hip to say so. That gave us a really good head start."

For their whole grains program, for instance, they did a complete sandwich overhaul, offering whole-grain options without raising sodium levels or compromising taste. "Whole-grain ciabatta as a carrier for our sandwiches helped us build alternatives, and we can build any sandwich on that whole-grain roll now," Gray says. Aramark has introduced yogurt instead of mayo on sandwiches across many units as well. Gray explains: "I think we made tremendous progress in making vegetables and a vegetarian sandwich approachable by using hummus as a spread and as a main ingredient that just tastes great." Her team also doubled down on seasonally appropriate choices to increase excitement around cooked vegetables.

One of their best received strategies was a grain bowl pop-up. Bowls featured 50 percent grains, 50 percent vegetables, often tri-colored quinoa or farro, with brightly colored vegetables, and an option to top the bowl with a small chicken breast if desired.

Rolling out healthier menu options hasn't always been smooth sailing, though. "With our sodium reduction targets, we tried in the beginning to go right down to a low-sodium soup, under 400 mg of sodium, when people were used to having a soup on the street that was over 1000 mg of sodium," says Dan Wainfan, associate vice president of health and wellness for Aramark. "We found out we were actually turning people off." From that came an important lesson that 0 to 60 is not an approach that would work for them. Instead, they shifted to incremental changes: "We'd go down by 100 mg or 200 mg at a time, or add ginger to a carrot soup, or pureed sweet potato that hadn't been there before, so that over time, we got to a variety of custom developed, locally prepared soups, that all had under 700 mg of sodium per serving, and many of them had even less, but we did it in a stepwise fashion, and by adding flavor in other innovative ways. So I think that was a learning by the school of hard knocks."

The biggest challenge has been getting people to try new things, Wainfan says. "Our goal is to get to a place where food discovery is exciting and rewarding and fun, as opposed to something you have to do to have a better doctor's appointment. Because that doesn't last very long."

Working Hand in Glove

There are many reasons Aramark and American Heart Association were a fitting match for this joint initiative.

"AHA's mission is to build healthier lives, free of cardiovascular disease and stroke," says Dorothea Vafiadis, national director of healthy living for the American Heart Association. "We recognized that, as a public health organization, a public-private partnership is really the way to do it. We can't just be public health, criticizing what's happening—we have to be out there, engaged with stakeholders around clear, shared goals." AHA was particularly drawn to Aramark's culinary expertise and broad reach in the marketplace.

"In looking for a partner to collaborate with, connecting with the preeminent advocacy organization in the country was the way to go," says Wainfan of Aramark, emphasizing AHA's deep scientific knowledge, expertise, and research capabilities, as well as their national footprint of volunteers. In fact, with over 30 million volunteers and supporters, AHA is the nation's largest voluntary organization committed to tackling heart disease and stroke. Aramark was particularly inspired by the "wonderful simplicity and symmetry" of the 20 percent by 2020 framework, motivating both of their organizations in tandem.

Wainfan emphasizes that this is not a single dimensional kind of sponsorship arrangement; it's about truly working together on shared goals on a daily basis throughout many years.

Beyond the Plate

The Healthy for Life 20 By 20 partnership consists of much more than the already robust undertaking of overhauling menus. It consists of four pillars: menu impact and innovation, community health and awareness, consumer and employee engagement (looking externally at diners as well as impacting Aramark's own 170,000 employees), and thought leadership. For this second piece, in the spring of 2016 they ran their first community empowerment program, piloting a community health engagement program in five community centers in three underserved communities in Chicago, Philadelphia, and Houston. AHA led a rigorous evaluation model, in which participants engaged in month-long modules, and researchers compared participants' behaviors and attitudes toward healthier foods. They were thrilled to see that, by the end of the program, 69 percent of participants increased their fruit and vegetable consumption by at least half a serving per day, and 48 percent increased their whole grains consumption by at least one serving.

"In order to eat better, people need to have choices available where they live and work and play," says Vafiadis of AHA. Aramark not only engages consumers directly, but by having conversations with its vendors to change their ingredients and sourcing practices. "We recognize that it's across the food chain that change needs to take place."

The strategic cross-pollination of their organizations even happens at the CEO level. AHA has a CEO roundtable of 22 CEOs from leading corporations, and Aramark's chairman, president, and CEO Eric J. Foss is among them. AHA considers that a strategic piece of their overall partnership as Foss from Aramark and other CEOs from leading companies across the country collaborate with AHA leaders to share best practices that can improve the health of their own employees and have a broader impact on public health.

While both organizations are proud of their multiple work streams, they recognize the biggest hurdle is changing the food environment as a whole. To see change at the scale to which they both aspire, Healthy for Life 20 By 20 is beginning to showcase some of the best practices from this partnership and lessons learned from their work thus far.

LESSONS LEARNED

As for the best ways to reach their shared targets, the leadership of Healthy for Life 20 By 20 has learned some key lessons along the way.

- Helping consumers have more say in what's in their foods has been a key to mobilizing consumer engagement, says Dorothea Vafiadis. AHA launched a letter-writing campaign, with over 10,000 letters sent to CEOs of food companies, in which consumers asked for lower sodium and other improvements to products while keeping the flavor right. "Consumers need to have choice," she says. "They're wanting more and more to have power over their destiny and take control." She also emphasizes not to forget to give positive feedback to those companies who do make changes in the right direction.

- Annette Gray's top takeaways for exciting diners about healthier options are to stay on-trend with what's out in the marketplace, to lead with beautiful colors that pique excitement around a dish, and to focus on simple authenticity, rather than "trying to engineer it too much," she says. "If it is a roasted carrot, it should be the best roasted carrot you can have."

- For Dan Wainfan, it comes down to: "Don't be the food police." For Aramark, that means ensuring indulgent choices are still available, and that the indulgent options receive gradual improvements as well, but that they are offering many more opportunities to engage people in healthy food discovery. "There are times when people want a brownie or a burger—we all do—so it's important we focus on the big picture: empowering people to discover what healthy food can do to make a difference in their lives."

Aramark Photos by: Aramark/Edward Savaria Jr.

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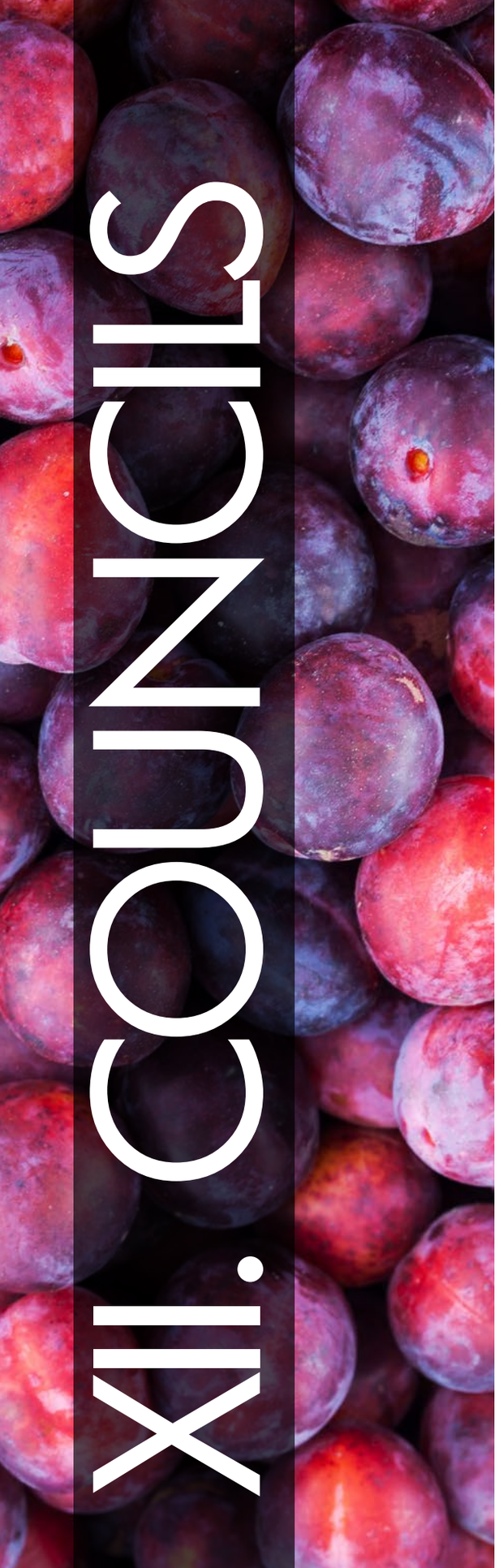

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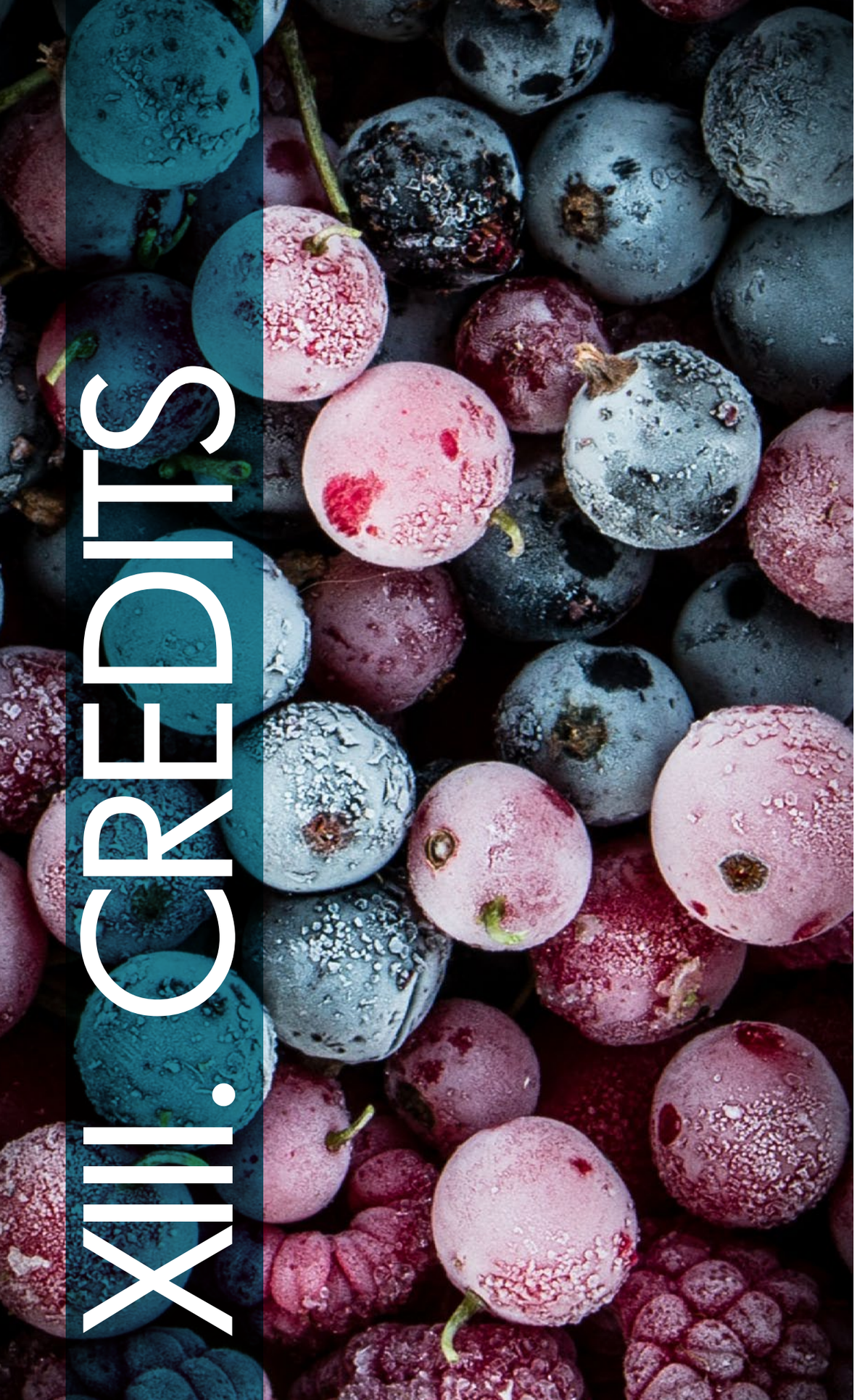

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