PROTEIN CONSUMPTION AND PRODUCTION

The average American adult man consumes 75 percent more protein than is required; for American women, it's 50 percent more. Animal-based foods like meat, fish, poultry, eggs, and dairy account for approximately 70 to 85 percent of this dietary protein. Yet, plant-based foods such as nuts, seeds, beans, peas, legumes, grains, and cereals are also important sources of high-quality 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.

Although red meat consumption in the U.S. had been declining steadily for decades, increases have been seen again in recent years. Red meat consumption (after adjusting for losses) was 33 kg per capita in 2016 and poultry was 27 kg. Other data suggests further increases in 2017 and 2018. This puts the U.S. among the highest meat consumers globally. In recent decades, meat consumption has increased sharply worldwide, especially in developing countries. That said, there are important distinctions between red meat and poultry in terms of both environmental and human health effects, as well as between meat and other protein sources.

ENVIRONMENTAL IMPACTS
Animal-based foods contribute disproportionately to the total environmental costs of food production. The main reasons for these impacts are enteric emissions from the digestive activities of ruminant animals such as beef and milk cows, emissions to air and water from manure management, and the growing of crops to produce animal feed. Thirty-eight percent of the U.S. corn crop, which uses more land than any other crop, goes to feeding livestock. Feed conversion efficiencies, or how effective an animal is at converting feed into edible meat, 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, 8:1 for poultry meat, and about 6:1 for eggs and dairy, and sometimes lower than 2:1 for fish and insects. These differences, combined with methane emissions from ruminants, explain the variability in greenhouse gas emissions (GHGE) from animal protein sources seen in the figure on page 37; beef and lamb show notably higher impacts.

Production methods certainly influence the environmental impact of animal-based foods, but the type of protein chosen matters more. Popular alternatives must be fully assessed before being lauded as solutions. For example, pasture-based beef production can have many local environmental advantages over grain-fed beef, such as reduced water use and nutrient losses, and greater ecosystem biodiversity. Yet, often the GHGE associated with grass-fed beef are higher than grain-fed. Under some conditions and production methods, significant carbon sequestration under intensively managed pastures can be achieved, which may offset other GHGE, but this cannot be assumed. In summary, the GHGE of beef can be high, whether grain-fed or even when grass-fed, and dual-purpose systems, producing both milk and beef, may offer lower burdens per unit of food produced.

In the end, switching production methods alone will not be enough: We need to first serve much less beef, and then seek a premium product such as sustainably produced grass-fed, which may carry a higher price point, reflecting higher costs (a “less meat, better meat” strategy which, in principle, could allow food costs to remain constant). Greatly reducing the feeding of grain to cattle and instead relying on their ability to utilize grass and forages to produce both milk and meat can have many benefits, but it will need to be accompanied by large reductions in the quantity of beef produced and consumed. 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.

HEALTH IMPACTS
Red meat consumption also has significant impacts on human health. The science is clear that regular consumption of red meat contributes to higher 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, and unprocessed red meats should be classified as “probably carcinogenic” (Group 2A). It was estimated that a 50-gram portion (1.8 ounces) of processed meat eaten daily increases the risk of colorectal cancer by 18 percent. Red and processed meats have already been associated with type 2 diabetes, cardiovascular disease, and other chronic diseases; an increased cancer risk further underscores the need for consumers to reduce their consumption of meats, especially processed meats. While the 2015-2020 USDA Dietary Guidelines emphasize the role of overall healthy dietary patterns in reducing risk of chronic diseases, it does not single out the harmful effects of processed meats on health outcomes. It is unclear whether this issue will be addressed in the 2020-2025 Dietary Guidelines.

On the flip side, there is increasing 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 plant protein was not associated with risk. In a recent analysis of 131,342 participants from the Nurses’ Health Study and Health Professionals’ Follow-Up Study who were followed for two to three decades, higher intake of animal protein, particularly red and processed meats, was associated with increased risk of death from cardiovascular disease. They also found that substituting plant protein for animal protein, especially from red and processed meat, was associated with lower risk of death from cardiovascular disease.

The health effects of protein sources depend on comparison or reference foods. Compared to red meat, eggs and dairy products have less adverse health impacts. Although a recent study found a positive relationship between egg consumption and risk of cardiovascular disease, previous large cohort studies have consistently found that moderate consumption of eggs (up to one egg per day) was not associated with risk of heart disease or stroke in generally healthy individuals. Consumption of dairy products may affect human health in complicated ways, depending on the types of dairy products. Total dairy consumption has little benefit on body weight, diabetes, and cardiovascular disease, although there is some evidence that higher consumption of fermented dairy products (especially yogurt) is associated with lower risk of weight gain and type 2 diabetes. It is worth noting that although eggs and dairy are better protein sources than red meat, replacing eggs or dairy with plant protein sources such as nuts and legumes are likely to confer additional health benefits.

On average, Americans consume approximately 81 g of protein per day, of which approximately 85 percent is animal protein. In one possible scenario, even a 25 percent decrease in protein intake combined with a 25 percent shift from animal food to plant protein (from an 85:15 ratio to a 60:40 ratio) would better align with the current science around dietary guidance to improve human and planetary health.

Carbohydrate restriction continues to be promoted as an effective strategy for weight loss and chronic disease prevention. A recent meta-analysis indicated that the health effects of low-carbohydrate diets depend on food sources of protein and fat. Specifically, a lower-carbohydrate diet characterized by high amounts of animal fat or protein was associated with increased mortality, but a lower-carbohydrate diet with high amounts of plant-based fat and protein was associated with lower mortality. This study underscores the importance of consuming plant vs. animal sources of protein and fat in promoting longevity.

DIETARY CHANGE
Eating out more and eating meat less have gone hand in hand for more than a decade, as consumers continue to spend more food dollars on meals prepared by culinary professionals while red meat consumption has largely declined over time.

While animal-based proteins at the center of the plate remains the norm on most menus, the foodservice industry is helping to move the American diet in a healthier direction by offering more plant-based or plant-forward dishes. According to Mintel research, the number of new-to-market U.S. food and drink products that mentioned “plant-based” grew 268 percent between 2012 and 2018. Nielsen data commissioned by the Plant Based Foods Association show that sales of plant-based foods grew by 20 percent in the year ending in June 2018 compared to a 2 percent increase in all food sales in 2018, and up from an 8 percent increase in plant-based foods in 2017. Among the biggest 100 U.S. chain restaurants (including fast food, fast casual, and full service), 55 percent now offer at least one plant-based entree, according to the Good Food Institute’s 2019 restaurant scorecard, which also found that the word “vegan” now appears on 11 percent of menus. While this analysis did not include independent restaurants and smaller chains, it is clear to even a casual observer of such trends that menus across restaurants around the country and larger institutional foodservice segments are featuring more plant-forward offerings. The emergence of political pressure further supports this evolution, most recently from the bill that now former California Governor Jerry Brown signed into law in September 2018 requiring hospitals, healthcare facilities, and prisons in that state to offer plant-based options at every meal.

Fast Company went so far as to predict that “2019 will be the year alt-meat goes mainstream.” The Impossible Burger, now available in more than 5,000 locations in the U.S., including at fast food chains like White Castle, got an upgrade to the “Impossible Burger 2.0,” a gluten-free version that utilizes soy instead of wheat, at the start of 2019. Similarly, Beyond Meat launched its next generation Beyond Burger at Carl’s Jr. and A&W, and claims that it has sold more than 25 million burgers worldwide, with its products carried in over 32,000 grocery stores.

The next step beyond these plant-based meat (and seafood) options is the emergence of lab-grown, or cultured, meat and seafood. Although we are likely years away from lab-grown animal protein being widely available and accessible for consumer use—with price and scalability currently standing as key barriers—that industry will have significant public health and environmental implications. Policies and regulations yet to be developed will also determine its progress. Similar to the dairy industry’s failed attempts to restrict the use of “milk” as applied to nut and other non-dairy beverages, beef and farming industry groups are currently lobbying legislators to regulate the term “meat” in ways that could prohibit lab-grown and plant-based products being labeled as such. Regardless, all signs point toward continued growth of and consumer interest in more plant-based and plant-forward menu options that both purveyors and foodservice operators seem happy to accommodate.

The prevalence of alternative “meat” products in the marketplace has outpaced the research on their environmental and health impacts, but mounting evidence is positive. For example, a 2018 study found that the Beyond Burger generates 90 percent less greenhouse gas emissions, has 99 percent less impact on water scarcity, and has 93 percent less impact on land use than a burger made from U.S. beef. Contrary to common misconceptions, for most people with reasonably varied and diverse diets, there is negligible difference in overall protein quality between a mostly plant-based and a more animal-based diet.

We have also seen numerous studies exploring the environmental and human health effects of dietary 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. These patterns can be seen among self-selected diets in the U.S. Using the nationally
representative dietary recall data, researchers examined the linkages between diet, health, and environmental impact. Individuals’ diets were ranked based on the GHGE associated with their production. Compared to those with high dietary GHGE, those in the lowest emission group consumed more than twice as much plant protein foods and less than half as much animal protein foods, and also ate more poultry and less red meat. The lowest GHGE diets (bottom quintile) included more vitamin E, folate, and dietary fiber, and less sodium and saturated fat than the highest GHGE diets. However, there was a higher content of calcium, vitamin D, and potassium in the highest GHGE diets. Shifting the diets in the highest quintile to diets with an average carbon footprint would bring the U.S. 10 percent closer to emissions reduction targets. This means that diet shift can play an important role in climate action at city and state levels, and culinary professionals can greatly influence this cultural shift. But according to a new study funded by the federal beef checkoff program, consumers who value nutrition and the environment tend to purchase less beef, so as these concerns grow, we might anticipate lower demand for red meat.

Chefs and foodservice operators should focus on two key impacts they can have on consumers’ attitudes when it comes to proteins, through their menus—both in the design they conceptualize and the language they use. They should reduce their reliance on red meat and instead feature more plant-based dishes, including offering smaller meat portions accompanied by craveable and flavorful whole grains, legumes, and vegetables. On the menu itself, chefs should then describe dishes more holistically rather than always featuring the animal protein first, which contributes to an unbalanced perception of its importance. By using descriptions that make meat and plants equally enticing, they can create dishes that are healthier whether their diners notice it or not. Chefs also need to help consumers understand that proteins are present in most whole foods. Instead of using protein as a synonym for meat—whether it is during culinary demonstrations or on fast-casual menus where customers pick from a variety of options—chefs should instead use the term “animal protein” when they refer to such a thing. Additionally, when appropriate, chefs can speak of “plant-based protein”—a simple vocabulary shift that may go a long way.

**SCORE: 3.5**
The foodservice industry continues to offer more plant-forward menu options highlighting plant-based protein, with alternative meat products becoming mainstream and lab-grown cultured meats arriving on the horizon.

**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.
- While animal-based proteins at the center of the plate remains the norm on most menus, the foodservice industry is helping to move the American diet in a healthier direction by offering more plant-forward dishes, with alternative meats becoming mainstream and lab-grown, cultured meats arriving on the horizon as well as more dishes where meat or other animal protein plays only a minor or supporting role.