



**RE: Dietary Guidelines Advisory Subcommittee Request SC5-2A: Food Systems Sustainability:
Elements of a Whole Food System**

The Laurie M. Tisch Center for Food, Education & Policy in the Program in Nutrition at Teachers College Columbia University is dedicated to improving the food system through a combination of nutrition education and policy changes. The Center is comprised of a team of researchers, practitioners, and students who work in concert with nutrition educators from across the country, policy makers, and community advocates.

The Center strongly supports the inclusion of sustainability issues in the creation of the Dietary Guidelines for Americans, 2015. Dr. Joan Gussow, Professor Emeritus of our program, has taught our students a system-based framework to understand the complex food system since 1970. As early as 1986, Gussow and Dr. Kate Clancy (Visiting Scholar at the Center for a Livable Future Johns Hopkins University School of Public Health) first suggested that the Dietary Guidelines for Americans include a focus on sustainability [1]. This legacy has continued with current faculty and students, and is captured in the recommendations delineated here.

The system that produces, distributes, and processes the food that sustains and nourishes us is intricate. It is imperative that our nation's dietary guidance considers this system. To do so, our considerations must go beyond the nutrient composition of food and the health consequences of our eating patterns. The eating patterns we suggest must also take into account broader issues such as minimizing natural resource use throughout our food system and decreasing unintentional by-products that potentially harm soil, water and air. Then we can be assured that our guidelines promote both health and sustainability.

There have long been calls to connect messages about healthy eating to agricultural policies [2]. We realize that given the complexity of our agricultural policy, this will be a long process. Yet, if we can use the Dietary Guidelines for Americans to build demand for a food system that does consider both sustainability and health issues, we can initiate these connections. Bringing together food guidance and agricultural policy also helps to facilitate conversations about American food security. The better we understand food's journey from the farm to the plate the more we move towards a secure and safe food system.

The Dietary Guidelines are the preeminent means of nutrition education for our citizenry; they serve as the basis for education in classrooms, community centers, grocery stores, and hospitals, and are the starting point for federal food policies, such as food assistance program regulations. They offer great opportunities to help people think broadly about food. Reports and articles regularly link ecological issues such as climate change to our future ability to produce food [3,4]. If these issues are not part of

the Dietary Guidelines for Americans and hence not part of our nation's nutrition education, people will not know how to connect messages about sustainability and the food system to messages about healthy food choices. This is important because we need to counteract Americans' confusion about the conflicting messages about what to eat. When people are confused they are less likely to make changes to what they eat [5]. Considering sustainability issues enables the dietary guidelines to educate people to make these important connections and synthesize what they hear about food, climate change, and healthy eating instead of seeing each piece of information in isolation.

Since their inception in 1980, the Dietary Guidelines for American have evolved every five years to represent the latest of scientific evidence about the connections between nutrition science and health. Considering food system sustainability in the development of the 2015 Guidelines acknowledges the increasing evidence that we must move towards ways of producing food that will assure our ability to sustain food production on a changing earth.

As has always been the case, the recommendations of the Dietary Guidelines for Americans need to be straightforward, easily understandable, and applicable to all healthy citizens over the age of two. Additionally, the reasons to follow these Guidelines need to be compelling and motivational [6], while providing clear and specific knowledge about how to apply the Guidelines to daily lives [6,7].

We would not be the first country to incorporate sustainability into our dietary guidance: Europe has done so and Brazil has recently proposed such guidelines [8,9]. The Brazilian guidelines provide specific and actionable information, as in the recommendation to "prepare meals from staple and fresh foods." Our nation's Guidelines can follow suit, for example with the recommendation to "eat mostly plants foods and reduce consumption of animal foods." This presents specific behavioral objectives that promote both personal and ecological health (described below), and is based on the most recent findings of environmental and nutritional science.

To help the Committee begin to consider how to incorporate sustainability issues into the Dietary Guidelines for Americans, we provide the following five recommendations. For each, we explain what the recommendation means, provide evidence for how it promotes both sustainability and health, and suggest how Americans can apply it to their daily lives.

I. EAT MOSTLY PLANT FOODS AND REDUCE CONSUMPTION OF ANIMAL FOODS

Nutrition messaging can encourage consumers to choose plants (e.g. fruits, vegetables, nuts, seeds, and whole grains) while reducing consumption of animal foods (e.g. meat, dairy, eggs). A sustainable diet does not preclude the consumption of animal foods, but does selectively exclude or reduce those products that contribute to excessive greenhouse gas emissions (GHGE) and other environmental concerns [8,12,20].

Conserved Natural Resources. Choosing plant foods would decrease the amount of natural resources our nation uses. For example, beef production consistently emits more CO₂ [10,11,12], requires more water [14], and uses more land [12] compared to other foods. Fruit and vegetable production, in contrast, releases fewer GHGE per ton of food produced [10,11,12], requires less water per equivalent caloric density [14], and is generally less land intensive [12]. The Institute of Medicine (IOM) calculates that reducing individual meat consumption by 75% and replacing it with fruits, vegetables, and cereals would result in a 27% reduction in land usage, 31% reduction in water usage, and 46% reduction in GHGE [8]. The Environmental Working Group estimates that if the population of the

United States consumed no meat or cheese for one day, the reductions in CO₂ would offset the use of 7.6 million cars that day [16].

Improved Diet Quality. Americans generally eat more saturated fat than recommended. One quarter of saturated fat in the typical American diet comes from beef and cheese [17] and total annual American consumption of meat averages 242 pounds [18]. In contrast, plant foods are high in “Foods and Nutrients to Increase,” (e.g. potassium, dietary fiber) as delineated in the Dietary Guidelines for Americans, 2010. The consumption of plant foods also allows individuals to become satiated, providing a greater volume of food for fewer calories, owing to plants’ high water and fiber content [15]. Despite assertions of inadequate nutrition with lower consumption of animal products, studies with hypothetical scenarios have shown that mostly plant-based, sustainable diet patterns can successfully meet human nutrient requirements, and may require fewer financial inputs [12, 20].

Reduced Fish Consumption. The current Guidelines encourage citizens to increase their intake of seafood in place of other meats because of the beneficial omega-3 content. However, sustainability guidelines should not recommend high fish consumption, particularly when other plant foods such as flax seeds and walnuts are higher in omega-3. Current domestic fish production and capture does not allow for Americans to meet these Guidelines. The IOM estimates that between 12-24 billion pounds of fish are necessary if the population followed the fish consumption guidelines, while only 8.851 billion pounds are available [8]. Worldwide, over half of the world’s fisheries are fully exploited, and approximately one-third are overexploited, depleted, or recovering from depletion [19]. To address depleted fish populations, destroyed ocean habitats, and polluted water, the Guidelines must differentiate among specific seafood choices, and encourage consuming sustainable seafood choices when citizens eat seafood.

II. EAT FOODS CLOSE TO THEIR NATURAL STATE

Nutrition education can encourage people to eat more “whole foods” that are in their natural state or foods that have been minimally processed, that is to preserve them or increase their palatability. Processing is the manipulation and addition of ingredients to whole foods, and with each successive step in processing (e.g. whole grains to breakfast cereal) more energy is required. Thinking about how many steps and what is involved in each step is important.

To this end, the education that accompanies the dietary guidelines could decrease confusion our citizens have about food processing. This education could help people understand that some processing such as grinding wheat into flour, making apples into apple sauce, or culturing milk to make cheese or yogurt are done to make food more palatable and/or to preserve the food. We can consider these foods minimally processed, and indeed these foods can be part of a healthy and ecologically sustainable diet. Yet, much of the food currently available in our food supply is a combination of many highly refined ingredients (mostly from corn or soy) that have little resemblance to the original foods from which they are derived. We can consider these foods highly, overly or ultra processed. When all processing is lumped together, it creates confusion and can be easily dismissed. The Guidelines could be a way to help people learn to differentiate minimally and highly processed foods.

Encouraging consumers to eat whole foods foods that have been minimally processed is a clear message that will help consumers choose whole foods and avoid processing. Additionally, when people learn more about the origins of food they could become excited about and empowered to cook their own meals.

Improved Nutrient Intakes and Dietary Patterns. Eating highly processed foods increases the likelihood of consuming additional solid fats, sugars, and sodium and may induce unhealthy dietary patterns like meal skipping and snacking [21]. These eating patterns displace consumption of recommended whole foods [22], leading to shortfalls in nutrients of concern (e.g. potassium, dietary fiber, calcium, and vitamin D) and increases in intakes of foods to reduce (e.g. SoFAS and sodium). Choosing whole foods instead of highly processed foods can reverse this trend.

Conserved Natural Resources. Compared to highly processed foods, whole and minimally processed foods require less total energy and resources to produce, and in turn generate less waste. The energy required to package highly processed foods is immense. Food product packaging accounts for part of the 4.4 pounds of waste produced per person per day [23]. The EPA recommends consumers employ “source reduction,” i.e. alterations in behavior to prevent the creation of waste. Purchasing and consuming whole foods that are minimally packaged is one way in which consumers can reduce waste at its source. Another drawback is that food packaging and processing exposes consumers to toxic chemicals, compounded in those who consume much processed food [24].

III. EAT MORE ORGANICALLY PRODUCED FOODS

Conventional farming methods use large amounts of natural resources. Alternative methods, like organic farming, are more ecologically sustainable for a variety of reasons, including: conserving natural resources, improving soil management, and promoting biodiversity. Encouraging consumers to consider the method by which their food was produced helps develop a broad and comprehensive view of food systems, instead of a focus on individual nutrients.

Greater Soil Conservation and Soil Health. Loss of soil ranks as one of the top externalized costs of agriculture [25], due in part to excessive tilling, overgrazing of animals, and heavy equipment usage. Soil erosion, and the associated nitrogen runoff, is implicated in coastal dead-zones, particularly in the Gulf of Mexico [38]. Organic farming conserves and builds healthy soil by employing methods like cover cropping and crop rotation, which reduce soil erosion and nitrogen leaching as well as create more organic matter in soil [26, 25].

Conserved Natural Resources. The healthier soil on organic farms offsets the need for synthetic fertilizers, thereby requiring less energy inputs [30]. One meta-analysis found that the median energy usage on organic farms was 21% lower per production unit compared to conventional farms [26]. Further, organic farms are able to guarantee equal or greater yields than conventional farms while using less energy [26, 27, 31].

Greater Biodiversity. Globally, crop production has become homogenous and species-poor [45]. Organic farms reduce the introduction of synthetic pesticides, herbicides, fertilizers, antibiotics, and genetically modified (GM) seeds [29] into the environment. These farm inputs are implicated in the loss of biodiversity, most notably in the decimation of honeybees [32]. Organic farms have substantially more biodiversity in terms of flora and fauna than conventional farms [33]. Studies show that on organic farms species variety is 30% greater and organism abundance is 50% greater than on conventional farms [26]. Protecting biodiversity is imperative to preserving distinct plant genetic traits, allowing for more diverse nutrient compositions in those we consume. These distinct genetic traits promote natural pest defense mechanisms and prevent large crop loss during natural disasters. Biological pest control (i.e. predation) and pollination are more likely found in organic farms than conventional ones [34].

IV. EAT MORE LOCAL FOODS

Choosing local foods is important for the earth, the farmer, and the consumer. When people seek out local foods they are more likely to consume a diversity of plant foods, eat more whole and minimally processed foods, and be more aware of the growing methods used to produce their food [41].

Increased Consumer Knowledge. Many consumers are disconnected from how and where their food is produced. Creating a market for locally produced foods supports the USDA's advice to "know your farmer, know your food." Food produced locally is seasonally tied, helping consumers to understand that food production is connected to Earth's cycles. Food can also be grown in community, school, and personal gardens, giving consumers an even closer connection to the source of their food.

Improved Local Economies. Foods produced locally create food jobs across the nation and keep capital in local economies, building infrastructure and production capacity [35,36]. Rapid losses in prime agricultural land can be abated through support for local farmers, helping to keep farms in production [43]. The USDA has a vital economic interest to promote US-produced foods; encouraging purchases from local farmers supports this goal. Consumers can access local foods from sources such as farm stands, farmers markets, farm-to-school programs, food retailers, and community supported agriculture (CSAs).

Conserved Natural Resources. The Academy of Nutrition and Dietetics suggests that "sourcing locally is a way to protect the local agricultural landscape, indirectly conserve water and energy, and avoid increases in food costs as energy costs increase" [37]. While the evidence about the relative carbon footprint of local food is still being debated, with the type of food, degree of processing, type of transportation, and method of production (organic vs. conventional) being equal, it is hypothesized that local food would be less resource intensive than an imported counterpart [39, 40].

V. LIMIT WASTE FROM FOOD

Our food system does not exist in a vacuum; we must consider both system inputs and outputs. Waste is endemic throughout the food system, starting on the farm, to post-harvest and packing, processing, distribution, consumption, and disposal [42]. The USDA ERS estimates uneaten foods in 2010 totaled 133 billion pounds, or 31% of the total foods available for human consumption [44]. Of this number, consumer-level loss was estimated at 290 pounds per person per year. Overall, following the eating patterns we recommend reduce both pre- and post-consumption waste.

Decreased Waste by Recycling and Composting. In addition to reducing food waste, the EPA recommends that consumers compost food waste and recycle food packaging [23], further decreasing waste and conserving natural resources.

We are hopeful that a focus on sustainability in the Dietary Guidelines for Americans, 2015 is a harbinger of coming changes in our food system. Taken together, these five recommendations can positively impact sustainability outcome measures like reducing GHGE, reducing the use of pesticides and herbicides, and reducing energy inputs to food production. They also affect behavioral measures like limiting "Food Components to Reduce" and extending "Foods and Nutrients to Increase" as delineated by the Dietary Guidelines for Americans, 2010. We believe that raising Americans'

awareness about the interconnections between the food they eat, their health, and that of the planet can successfully create demand for a sustainable food system. The inclusion of the aforementioned recommendations would strengthen the United States' food security by preserving and bolstering the ability to produce food through conservation of natural resources and prevention of environmental degradation.

Sincerely,
The Laurie M. Tisch Center for Food, Education & Policy

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