SUSTAINABILITY PRACTICES IN **SCHOOL FEEDING PROGRAMS**

By: Christine McCullum-Gomez, PhD, RDN

Introduction

School feeding programs offer benefits to different sectors of society including education, health, social protection, and agriculture. While the link between school feeding programs and educational and nutritional outcomes is well-documented, there is less research linking school feeding programs with sustainability practices that can improve human and planetary health. (1) In Europe, school systems have begun to assess the environmental impacts of school lunch programs to inform school meals policy. (2-10)

To date, most research on the environmental impacts of school menus has focused on the impact of carbon emissions and water use. (2-3, 5-10) However, the agriculture and food sectors are also responsible for a large amount of reactive nitrogen (N),1 which is released to the environment, mostly due to fossil fuel combustion and the application of industrially produced synthetic nitrogen-based fertilizers. Apart from climate change impacts, reactive nitrogen (N) can severely impact the environment and affect people's quality of life through reduced air quality. N pollution also leads to water eutrophication.2 (4) The nitrogen footprint3 is a useful indicator to estimate N pollution. The consumption of certain foods, such as red meat, accounts for a large share of consumers' N pollution. (4) In Spain, researchers estimated the nitrogen footprint of six fall and six spring school lunch menus for children aged 7 to 12 years that adhered to the Spanish school dietary guidelines. These authors found that school lunch menus incorporating beef exhibited the highest nitrogen footprint. Menus including non-meat sources, such as legumes, exhibited the least nitrogen pollution. Substituting beef with non-meat sources achieved the highest reduction (a 76% reduction) compared to the total nitrogen footprint of the school menus. Finally, Fall menus had a higher total nitrogen footprint (20% higher) than Spring menus. (4) See Figure 1 for a summary of the study results.

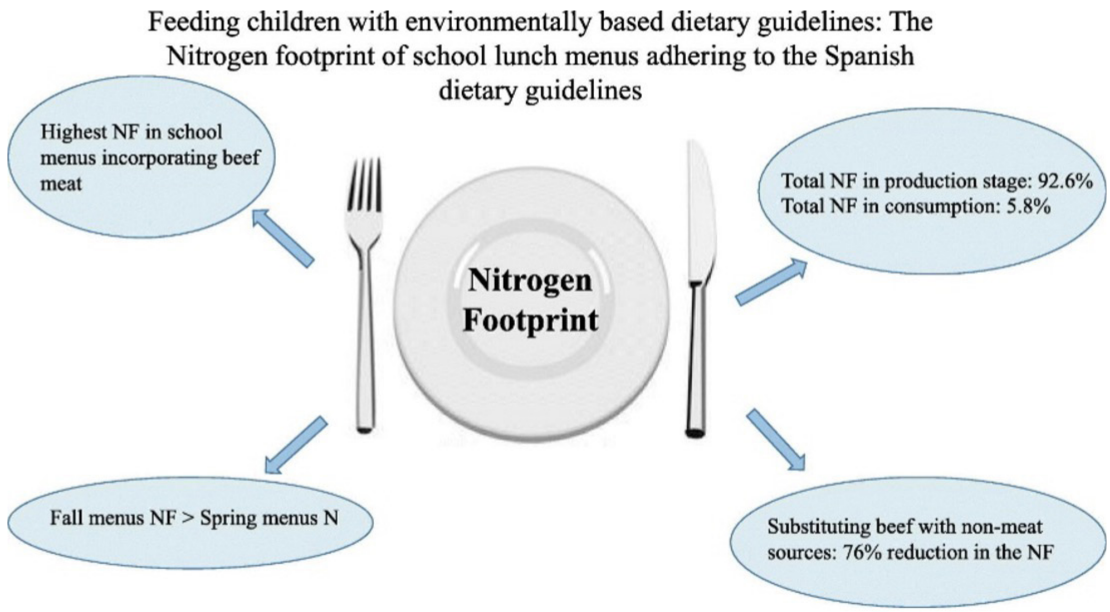

Figure 1. The Nitrogen footprint (NF) of school lunch menus adhering to the Spanish dietary guidelines (4)

School feeding policies and practices with environmental, economic, and social dimensions of sustainability have been adopted in many countries around the world including the United States (U.S.), Canada, England, Wales, Scotland, Germany, Spain, Portugal, Denmark, Italy, France, Finland, Sweden, India, Japan, Ghana, Kenya, South Africa, Tanzania (1, 11-13) and in numerous Latin American and Caribbean countries. (1, 8, 14) Researchers have highlighted the potential health, economic, and environmental benefits of including more plant-based meals in school feeding programs, especially if these meals are sourced seasonally from local producers and use eco-friendly agricultural practices such as organic production and agroecology. (1, 15-17) School feeding programs incorporating local foods have the potential for greater positive impact on children from lower-income households and those in racial minorities, as they have less access to healthy foods and have higher rates of overweight and obesity. (18)

Responsible consumption and production practices and education are included as goals in the United Nations Sustainable Development Goals (UN SDGs) and should be considered when developing sustainable school feeding programs. (1,15, 19). A recent systematic review on sustainability-oriented school feeding policies and practices reported that school gardens and educational activities were the most common sustainability-oriented strategies (1). Food service actions included menu planning, food purchasing of primarily local and organic foods, vegan/vegetarian school menus and the reduction of waste through composting, recycling, food donations, and adequate portion sizes. Finally, the authors concluded there is a need to develop instruments to assess sustainability practices at schools including enablers and barriers to their implementation. (1) The next section of this paper includes a synopsis of evaluations of two school feeding programs with emphasis on their environmental impacts. The first example is an assessment of the environmental impact of school lunches served in the U.S. National School Lunch Program (NSLP). The second example describes a partnership in Portugal whose aim was to evaluate the ecological footprint of school meals when shifting from meat-based to plant-based entrees.

Environmental Impacts of Foods Served in the U.S. National School Lunch Program (NSLP)

The School Nutrition and Meal Cost Study (SNMCS) assessed the environmental impact of a representative sample of school lunches served in the U.S. National School Lunch Program (NSLP). It collected data on over 2.2 million lunches served from a nationally representative sample of 1,207 schools and included over 1,300 unique food items. All lunches abided by the NSLP standards for a reimbursable meal, which requires students to select from at least three items from the following five offered meal components: milk, grain, fruit, vegetable, and meat/alternative (with one of these items being a fruit or vegetable). (20) Linking the environmental impacts of agricultural commodities to foods served allowed the authors to estimate the distribution of lunch impact across school days. “Mean environmental impacts were reported for global warming potential (GWP), land use, water consumption, freshwater eutrophication, marine eutrophication of lunches served in the 2014-2015 school year and standardized to 1,000 kcals. On average, lunches served contained about 620 kcal.” (20)

School lunch composition varied by quintile and impact category. Approximately 62,000 lunches were in the 1st quintile for impact categories, which the authors referred to as “low impact” lunches. “Conversely, there were ~ 38,000 “high impact” lunches, which were in the 5th quintile for all impact categories.” Low-impact school lunches were characterized by “more servings of whole grains, dairy, seafood, and nuts and seeds.” More specifically, “[t]hese lunches contained more than twice as much cheese and seafood, ~ 1/3 oz. eq. more grain, and ~1.5 oz. eq. more nuts and seeds compared to high-impact lunches.” “Low impact lunches contained more dairy products, because cheese is a common substitute for meat in vegetarian lunches.” In contrast, high-impact school lunches “were characterized by more servings of fruit and fruit juice, meat (including beef, pork, and poultry), and starchy vegetables. The high-impact lunches served 1 oz. equivalent more meat and contained twice as much fruit juice, protein foods, and potatoes, as low-impact lunches.” (20)

In summary, the authors observed that “Lunch environmental impacts were driven by meat and dairy and lunches with the greatest environmental impacts contained more meat, total protein, fruit, and starchy vegetables compared to lunches with the lowest impacts.” Because beef was the single greatest contributor to GWP, land use, and marine eutrophication, the authors recommended providing serving size or frequency limits for beef in the US NSLP. Dairy was found in greater quantities in the low-impact lunches even though it was one of the leading contributors to all environmental impact categories except water consumption. Low-impact lunches contained more cheese because they replaced meat in school lunches. In general, cheese has greater environmental impacts than plant-based proteins or other meat-alternatives. (21) Because of the potential issues with sodium and saturated fat content, the authors pointed out that “increasing cheese in the school lunch might not lead to the dual benefits of improved nutritional and environmental outcomes.” As such, these authors’ recommendations for changes to dairy in the NSLP were inconclusive. (20)

Low-impact school lunches contained greater servings of seafood, nuts, and seeds. However, there is considerable variability in environmental impacts across these foods and thus the authors cautioned that “school districts would need to give further guidance specifying food types and production practices” for these items. Finally, the authors concluded that increasing the whole grains requirement could be an effective strategy for reducing the environmental impacts of the US NSLP, as they are a nutritious, low-cost, diverse, and versatile food group. (20)

The Ecological Footprint of Meat-Based Versus Plant-Based School Meal Entrees: The Portuguese Vegetarian Association, University of Aveiro, and Global Footprint Network

In October 2021, the Portuguese Vegetarian Association, the University of Aveiro, and the Global Footprint Network collaborated with Portuguese municipalities to determine how switching from meat-based to plant-based meals could impact their schools’ ecological footprints. In this project, the ecological footprint was defined as “an environmental accounting tool that quantifies the pressure that human activities place on the environment by using and consuming natural resources and disposing of a specific type of waste, carbon dioxide. It is measured in hectare-equivalent units, global hectares.” (22) An ecological footprint can be calculated for an individual, city, region, country, and the entire planet.4 (23) In Portugal, “food is the greatest driver of the ecological footprint, representing 30% of the total. Meat and fish consumption represents half of the Portuguese food footprint.” (13)

For the Portugal school meals’ project, each participating municipality’s staff attended two formal training courses. Three workshops educating students and parents on sustainable food and plant-based school meals were also offered. The project results revealed that the ecological footprint of an average plant-based school meal was 92% lower than that of an average meat-based school meal. “This percentage was calculated by comparing the average ecological footprint of all meat-based meals (10 meals/city) and the average ecological footprint of all plant-based

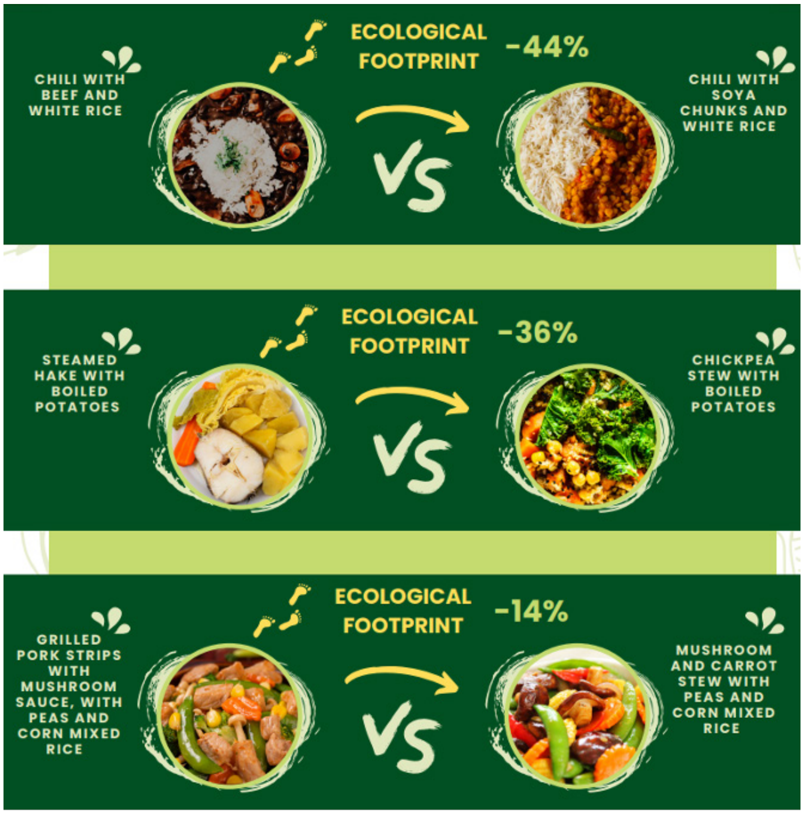

Figure 2: A reduction in the ecological footprint of Portuguese school meals by shifting from meat-based to plant-based entrees (22)

meals (5 meals/city).” Figure 2 illustrates the extent to which the ecological footprints of different school meal entrees were reduced by switching to plant-based options. Furthermore, if all schools adopted vegetarian meals, each school canteen’s ecological footprint would be reduced by 9 to 13% weekly. (13)

Conclusion

Estimates of the environmental impacts of school feeding programs are needed to design menus and make policy recommendations, which, in turn, can reduce their environmental impacts and help students develop food preferences aligned with sustainable dietary patterns. (20) Studies can be performed to better inform implementation of different components of new standards. (20) Financial incentives, including local food procurement, could encourage school districts to offer beef less frequently, and provide plant-based meals on school menus. (20, 24) School-based curriculum that emphasizes food literacy (e.g., cooking, gardening) and marketing campaigns could ensure that menu changes are well-received by students. (1, 15, 20) Sourcing plant-based school meals seasonally and locally that use eco-friendly production practices such as organic food production and agroecology can provide environmental, economic, and social sustainability benefits. (1, 15-17) Finally, introducing plant-based school meals gradually, giving careful consideration of the seasoning, naming, and aesthetics of plant-based meals, and training kitchen staff in the preparation of plant-based meals are all strategies that can be used to overcome potential implementation barriers. (25)

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Footnotes

[1] Reactive N is known as all N forms, nitrous oxide (N2O), nitrogen oxides (NOX), ammonia (NH3), nitrate (NO3−), nitrite (NO2−), nitric acid (HNO3), urea, amines, proteins, and nucleic acids, with the exception of the unreactive N2. (4)

[2] ***According to the National Oceanic and Atmospheric Administration (NOAA)***, eutrophication describes a problem with the nation's estuaries. More specifically, "Eutrophication sets off a chain reaction in the ecosystem, starting with an overabundance of algae and plants. The excess algae and plant matter eventually decompose, producing large amounts of carbon dioxide. This lowers the pH of seawater, a process known as ***ocean acidification***. Acidification slows the growth of fish and shellfish and can prevent shell formation in bivalve mollusks. This leads to a reduced catch for commercial and recreational fisheries, meaning smaller harvests and more expensive seafood." "***Harmful algal blooms***, ***dead zones***, and fish kills are the results of a process called eutrophication — which occurs when the environment becomes enriched with nutrients, increasing the amount of plant and algae growth to ***estuaries*** and coastal waters." Source: **oceanservice.noaa.gov/facts/eutrophication.html**

[3] The total nitrogen footprint [NF] calculated in this study consisted of the following components: production NF, consumption NF, transport NF, and cooking NF. (4)

[4] "**Earth Overshoot Day** marks the date when humanity's demand for ecological resources and services (Ecological Footprint) in a given year exceeds what Earth can regenerate in that year (biocapacity)." See: **www.overshootday.org/kids-and-teachers-corner/what-is-an-ecological-footprint/** To learn more about the ecological footprint and Earth Overshoot Day, including how you can help move back Earth Overshoot Day through adopting sustainable food interventions (#MoveTheDate), go to: **www.overshootday.org/solutions/food/**