The Climate Change Impact of US Food Waste

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Food waste, both in the US and overseas, has been getting increasing attention lately. This technical brief will show that we need to go beyond questions such as landfilling vs. composting and look at the life cycle of wasted food in order to understand the full climate change impact.

Data

Current food waste estimates from the USDA's Economic Research Service show that waste at the retail and consumer levels in the US can be as low as 15% or as high as 50%[1] depending on the commodity[2]. The analysis presented here is based on a selected group of commonly consumed food commodities and categories that account for most (but not all) of the food production and consumption. On average, 35% of this food is wasted.

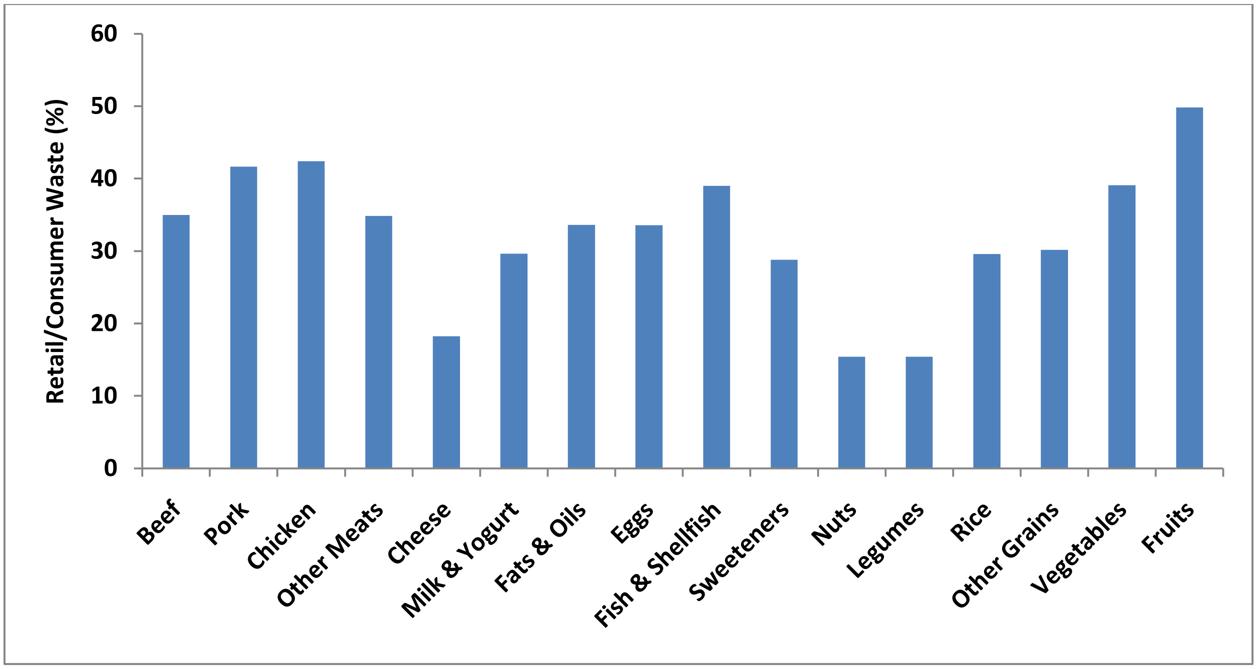

Figure 1: Retail and consumer waste percentages for selected food commodities in the US

[1] Some specific commodities (inside broad categories such as vegetables) may have a higher waste percentage. The waste figures also include the non-edible share of each commodity after it reaches the retail stage (ranging from zero for meats and dairy to 20% or higher for many fruits and vegetables).
[2] The USDA is in the process of updating these waste estimates, and we will publish an updated analysis once the new data set is released.

Figure 1 is based on USDA data and shows that a high proportion of perishable foods end up as waste. Much of the food waste goes to landfills.

Figure 2 shows the same data in terms of actual quantities wasted each year (million metric tonnes per year). This combines waste percentages with quantities of the commodities delivered to the retail stage, and scales USDA's per-capita waste estimates to the 2008 US population. This annual food waste estimate, for the commodities and categories considered here, adds up to just over 62 million metric tonnes[3].

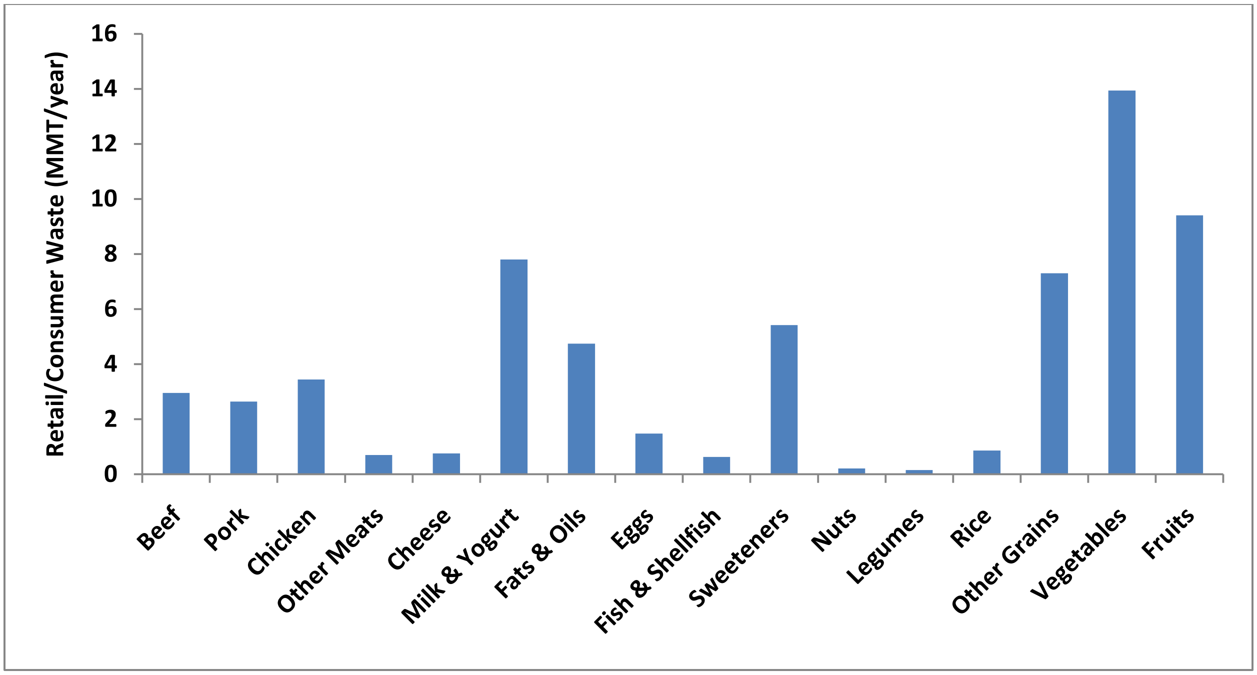

Figure 2: Retail and consumer waste quantities for selected food commodities in the US

Methodology

We used FoodCarbonScope™ to analyze the life-cycle greenhouse gas (GHG) emissions from producing, transporting and landfilling the wasted food (ignoring any waste prior to the retail stage). The life cycle assessment (LCA) includes factory processing of food (such as meat processing, canning, freezing, etc.), but excludes the impacts of food packaging and home or restaurant cooking. We used North American life cycle inventory (LCI) data for agricultural production and food processing from CarbonScopeData™ (from within FoodCarbonScope) to estimate the production emissions. We assumed a typical 1500 miles of road transport from production to retail for all commodities (with refrigeration in transit as needed), and landfilling

[3] Note that this food waste quantity is based strictly on USDA data and does not correlate with EPA estimates of food waste in municipal solid waste.

of waste in a temperate climate zone per EPA data on how methane is managed (US average of 21% methane flaring and 23.25% methane capture).

Results

Our analysis shows that 152 MMT CO2e (million metric tonnes of carbon-dioxide equivalents) are added to the atmosphere annually from the production, transportation and disposal of the uneaten food. If we were to include the many other food commodities that are produced and wasted in smaller quantities, and other emission sources such as the packaging and cooking of food destined for landfills, the overall climate change impact of food waste would likely be higher than this estimate.

According to the Product Policy Institute, the total emissions from the provision of food in the US are 906 MMT CO2e (imported food accounts for just over 1%). Their figure was derived using a different methodology, but if we were to use that as a reasonable baseline, then our estimated emissions from food waste appear to be over 16% of the national food-related emissions. Emissions from food waste also appear to be about 2% (and likely higher) of the total US GHG emissions. This is consistent with the recent report that food waste accounts for 3% of UK's domestic GHG emissions.

Comparing the relative contributions of life cycle stages (Figure 3), nearly 80% of the GHG emissions from food waste are due to production and processing. Waste disposal in a landfill accounts for less than 15% of the emissions.

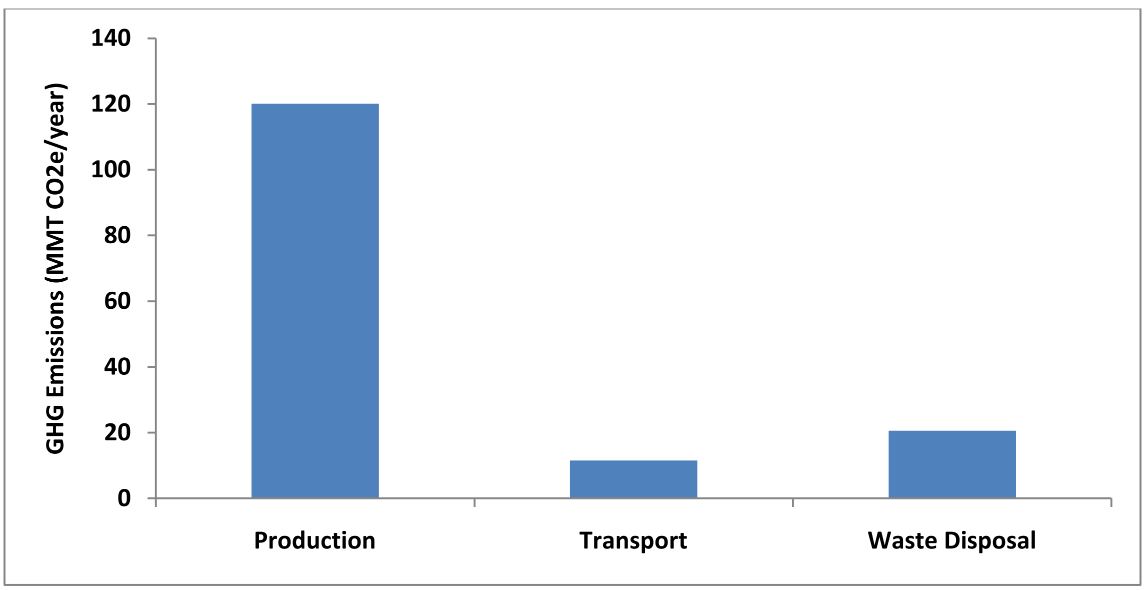

Figure 3: Greenhouse (GHG) emissions from wasted food: Comparing life cycle stages

Figure 4 profiles the emissions contributions of the selected commodities and categories. Even though fruits, vegetables, grains and sweeteners are wasted in large quantities (see Figure 2), the total GHG emissions from waste are heavily influenced by some of the meat products – in particular, beef is the dominant contributor to these emissions because of its high production emissions footprint.

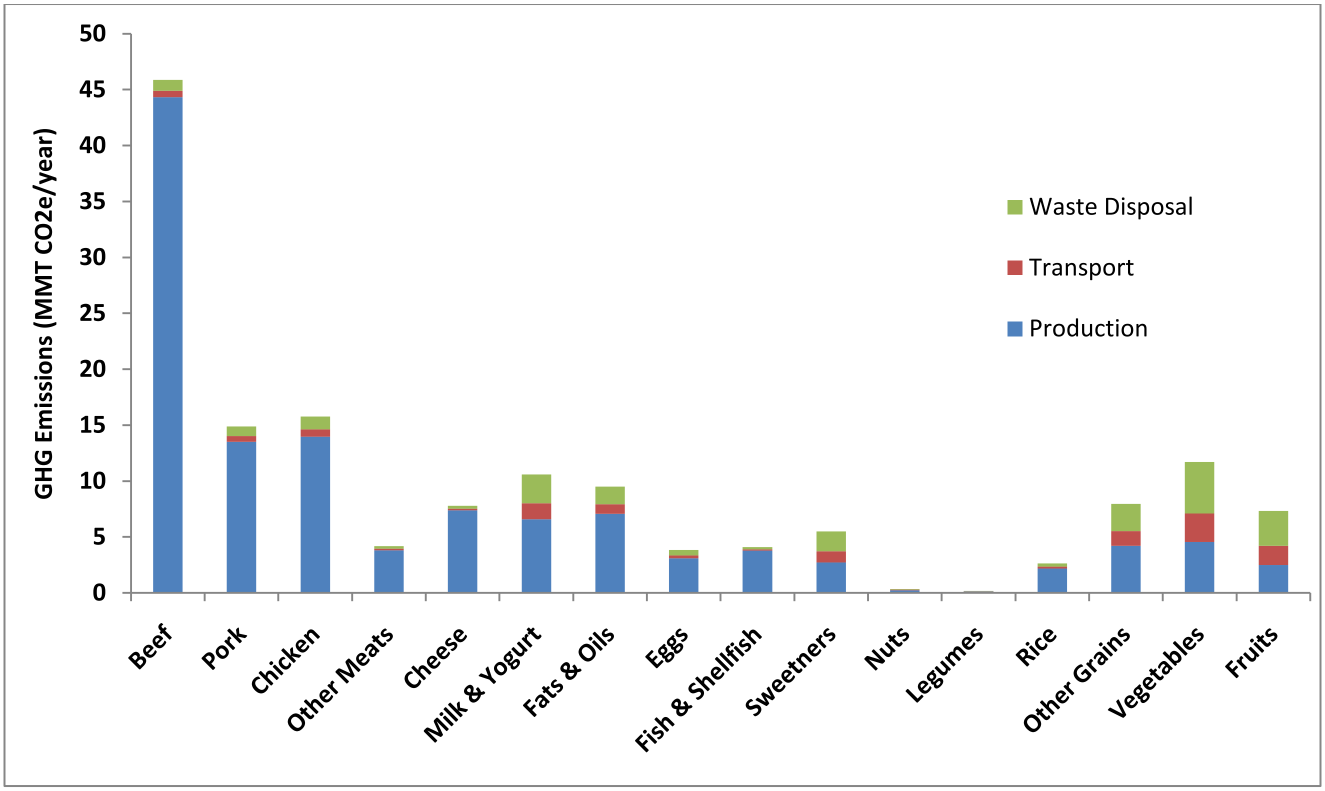

Figure 4: Greenhouse (GHG) emissions from wasted food: Comparing commodities

Conclusion

This preliminary analysis highlights the significant climate change impact of wasted food in the US, and the need to analyze it from a lifecycle perspective. Most of the GHG emissions from wasted food are attributable to agricultural production. There are clearly opportunities to both reduce emissions and reallocate some of the wasted agricultural production capacity to other uses such as growing feedstocks for next-generation biofuels. Moreover, a portion of the emissions reduction could be given up in return for using the surplus food to reduce hunger and malnutrition. We should begin to think of GHG emissions as a form of currency. We can use them for productive purposes, such as providing sufficient food and fuel for everyone, but emissions that do not serve a useful purpose are expenses that should be targeted for reduction.