Supporting Information

Shepon et al. 10.1073/pnas.1713820115

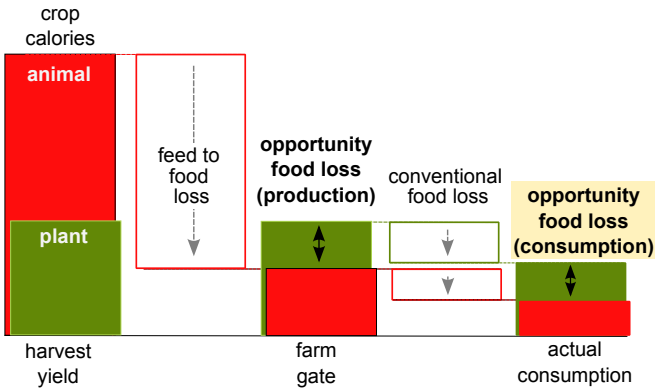

Fig. S1. Conventional and opportunity food loss for plant- and animal-based food. As an example, we show poultry versus its plant-based replacement diet. Although feed crops (red bar on the left-hand side, equal to $\approx 8 \times 10^6$ kcal/ac annually) have more than double the caloric yield per acre of plant food crops, the inefficient feed-to-food conversion results in fewer animal calories available at the consumption level. Conventional food loss (pertinent to both the plant- and animal-based food pathways) is the loss throughout the supply chain (from field to consumers). Favoring the more inefficient animal-based pathway is an opportunity cost due to producing and consuming fewer food calories, which we define as opportunity food loss. The opportunity food loss at the consumer level (right-hand side) is a function of both the opportunity food loss at production (farm gate) and the conventional food loss. Fig. 1 is a presentation of this figure using the metric of proteins. The opportunity food losses of the other animal categories are shown in Fig. 3 (proteins) and Fig. S2 (calories).

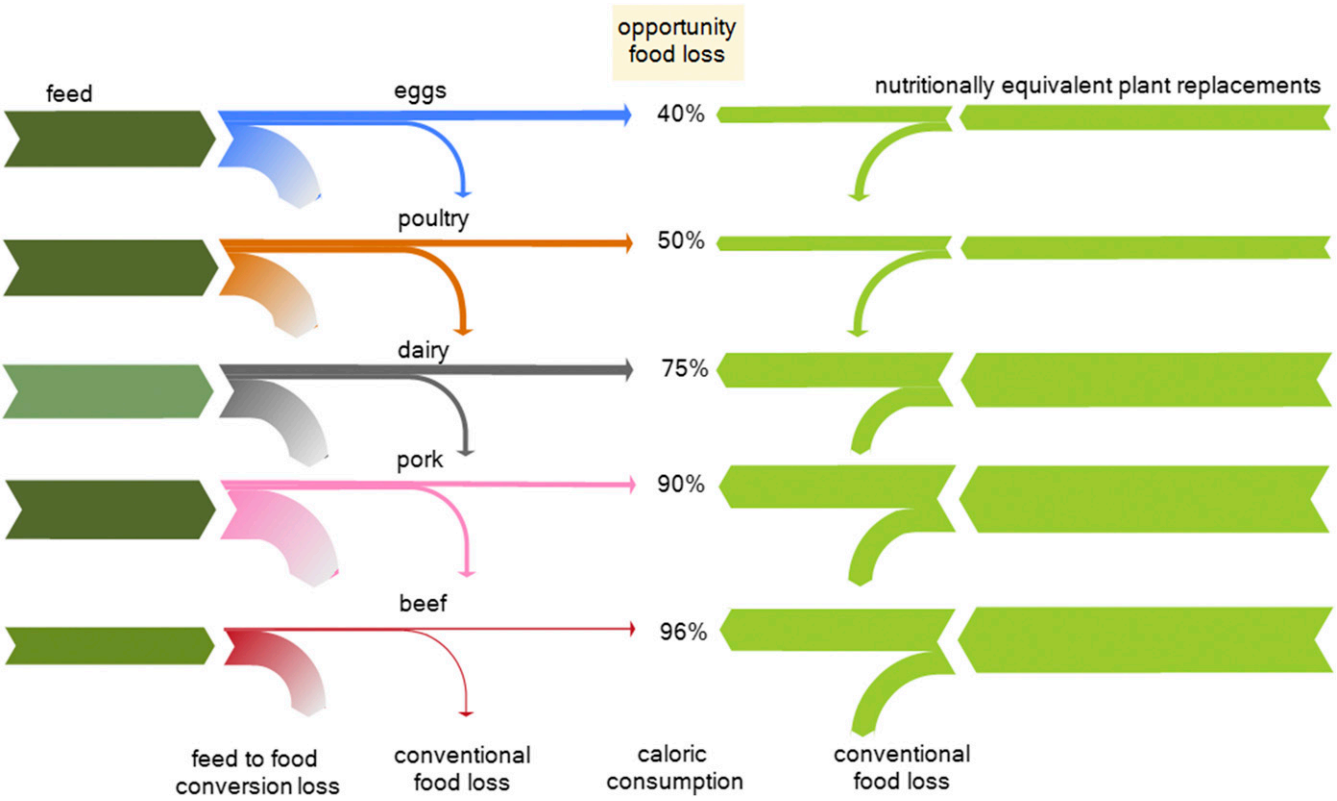

Fig. S2. The caloric opportunity food loss from production to final consumption for the five major animal categories and their plant-based replacement diets. Each row represents the cascade of calories from field to fork for each of the major animal categories and their plant-based replacement diet. Arrow thicknesses are proportional to the absolute value. Shades of green denote differing composition in feed due to inclusion of processed roughage. Caloric feed-to-food conversion efficiencies are calculated in ref. 1. Nutritionally equivalent plant-based diets differ in the items they comprise for each of the five plant replacement diets, thus presenting different caloric yields (breadths of arrows) for the same land area used for all starting arrows. Opportunity food loss values at consumption are given as percentages in the middle, representing the difference in caloric content between potential ready to eat plant replacement diets (right) and the respective animal category (left), all for an identical land resource investment. For instance, if reallocated to the production of plant-based replacement diet, the arbitrary land area needed to produce the feed for 4 kcal of beef will yield 100 kcal of human-destined nutritionally equivalent plant diet, which is an opportunity food loss at the consumer level of 96%. Fig. 3 is a presentation of this figure using protein metric.

1. Shepon A, Eshel G, Noor E, Milo R (2016) Energy and protein feed-to-food conversion efficiencies in the US and potential food security gains from dietary changes. *Environ Res Lett* 11:105002.

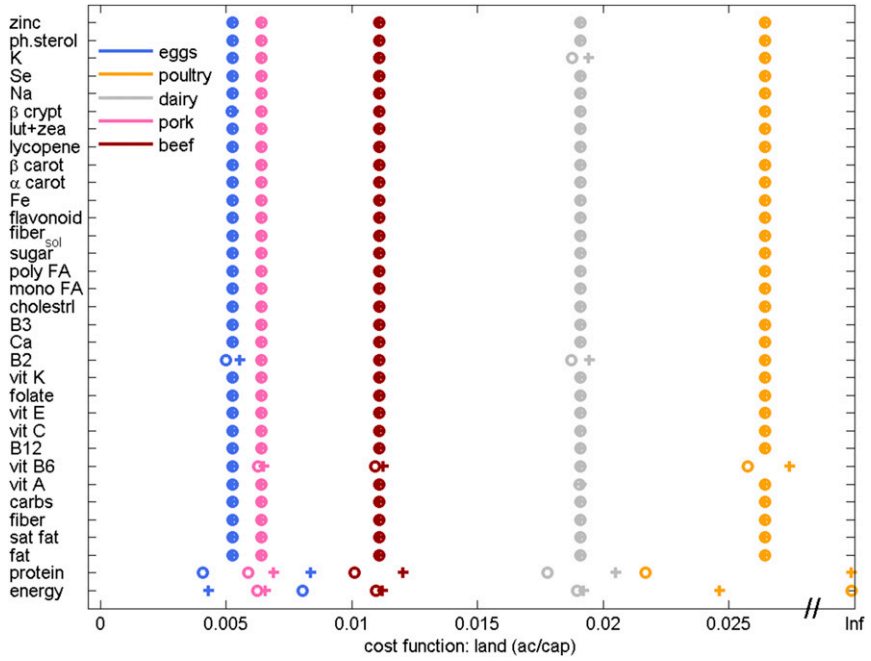

Fig. S3. Sensitivity analysis of the optimization scheme in which each nutrient of the replaced diet is increased (plus sign) or decreased (open circle) by 10% individually (with the other components unchanged). In cases where no solutions were obtained, results appear as "Inf."

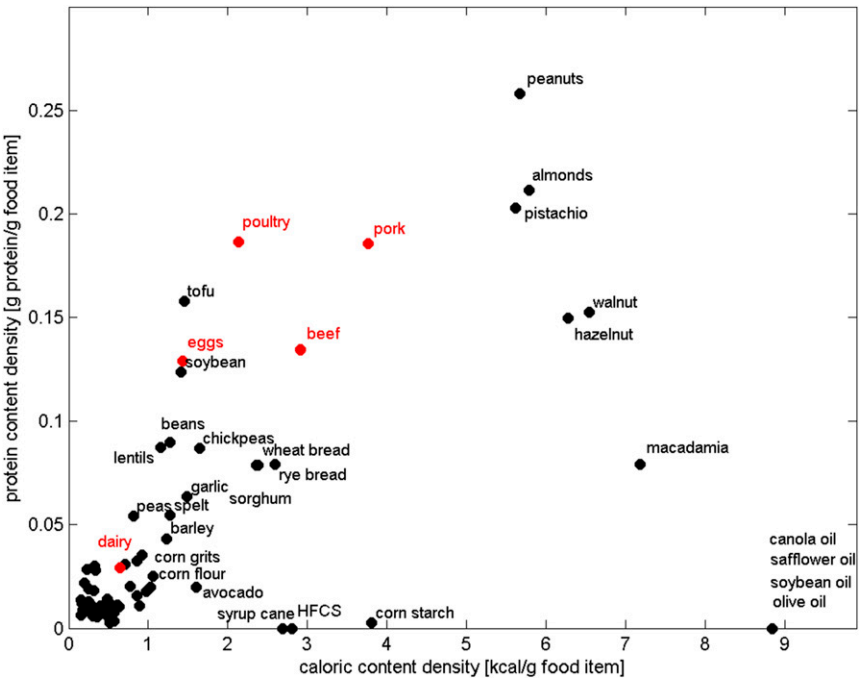

Fig. S4. Protein and caloric values per 1 g for each of the plant and animal food items used in our analysis.

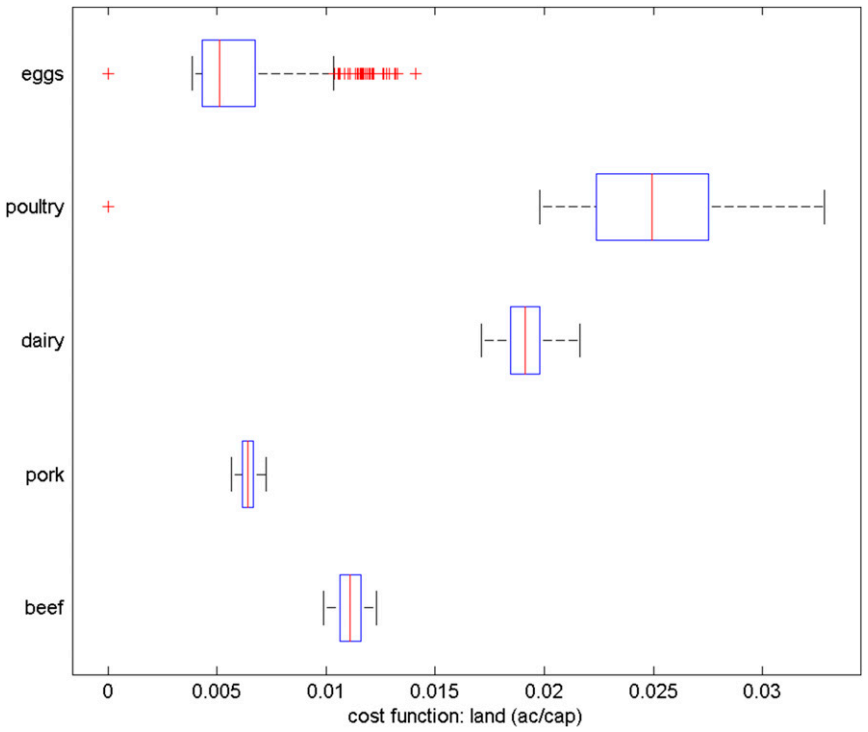

Fig. S5. Sensitivity analysis of the optimization scheme: Monte Carlo of 10^4 runs for each of the animal-based food items in which the nutrient requirements of the replaced diet (RHS vector in the optimization equation) are randomly multiplied (using uniform distribution) to yield values up to 10% higher or lower than the original value used.

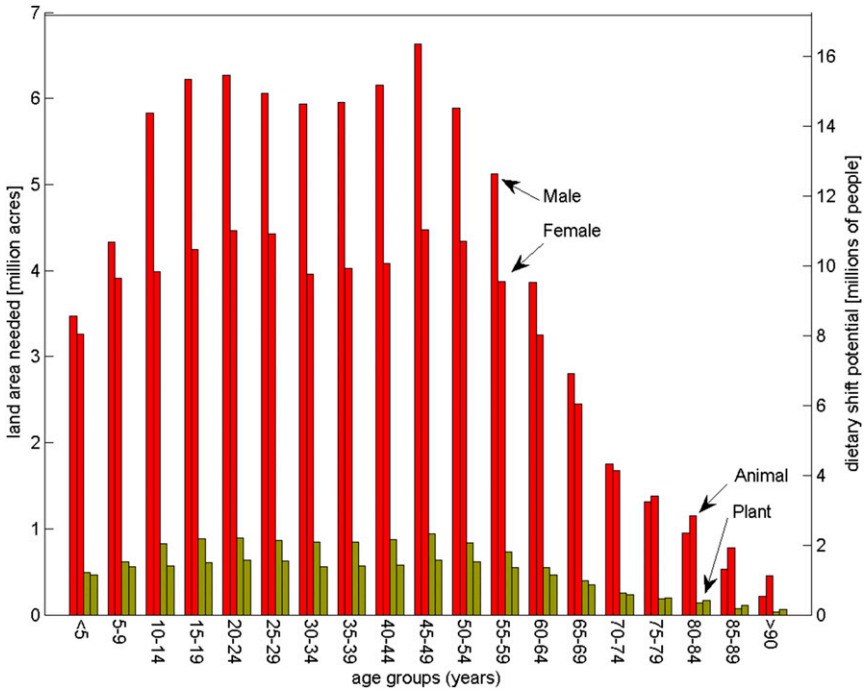

Fig. S6. The national land area of the animal portion of the mean American diet (red) and its plant-based replacement (green) portioned by age group (*x* axis, in years) and sex (left is male and right is female for each bar pair). The dietary shift potential distribution per age group and sex are indicated using the red bars corresponding to values on the right side of the *y* axis (in units of millions of people). This analysis assumes that each group consumes a diet equal in composition to the mean American diet but proportional to its average caloric intake. Consequently, we can calculate the contribution of each age group to the total dietary shift from demographic data on the distribution of ages and sexes in the US population.

Other Supporting Information Files

Dataset S1 (XLSX)
Dataset S2 (XLSX)
Dataset S3 (XLS)
Dataset S4 (XLSX)