WATER INPUTS

IN

CALIFORNIA FOOD PRODUCTION

Prepared For

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by

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C. General Assumptions

1. The study utilizes 1989 government statistics on crop yields, acreages harvested, and acreages planted.

2. Calculations are based only on those counties growing 1% or more of the total state acreage of the given crop.

3. The edible serving unit is assumed to be a portion of a larger, varied meal.

4. The study analyzes only a portion of the hydrological cycle. For purposes of this analysis it is irrelevant whether or not waste water is reused outside the analyzed process.

5. Since water requirements are neutral regarding source and may be met by local natural precipitation or groundwater and/or developed public or private water supplies, water inputs from all sources are counted.

6. The study counts water commonly available and/or applied to grow and process food crops. A portion of applied water is consumptively used for plant growth, transpiration, soil evaporation, and chemical processes, while the rest is non consumptively used in growing or processing . Non consumptive water may be reused after serving as carrying, leaching, runoff, washing, cooking, or cooling water.

7. Animal products analyzed in this study are assumed to be grown in California and are assumed to eat plants grown in California. However, not all animal products produced or sold in California are, at present, raised on California crops.

8. Analyses are for water inputs occurring in the food supply system prior to home cooking. Water directly used to pack, process, cool, and market foods, and to grow cropped plants or range feed for animals whose products are then eaten by man are included in the calculations.

9. Indirect water inputs, such as those in fertilizers, pesticides, antibiotics, tractors, harvesters, trucks, gasoline, diesel, electricity, or packaging materials are not included.

10. The water required to produce plant seeds is not included.

11. All calculations are for single product use. For beef, the single product is considered to be all cuts of edible beef. For dairy, the product is whole milk with its contained butterfat. The utility of inputs for joint use products, such as leather, bone meal, or edible meat resulting from culled dairy cows or egg layers have not been calculated.

12. The water required to produce "byproducts" fed to animals is not included in the accounting for water inputs to animal products.

13. Average current food harvesting, processing, shipping, and handling practices are assumed in order to calculate total embodied water.

14. The study assumes crops are raised according to average water, nutrient, and pest management practices. Irrigation efficiency is assumed to be 70%. Because of unavoidable runoff and deep percolation, and the need for soil moisture storage, for leaching of salts, and the maintenance of wildlife habitat, 100 % irrigation efficiency is rarely achieved or desirable.

15. For perennial agricultural crops plant water use efficiency during the non-irrigation season is assumed to be 100%. It is assumed that water used by range plants is also at 100% efficiency.

16. The study assumes drinking water for animals is used 100% efficiently at levels for optimum maintenance.

17. Analysis of water inputs for the gross crop unit required to produce an individual serving unit is based on correcting for shrinkage in weight occurring up to consumer purchase at the retail level and for the waste normally occurring in home food preparation prior to actual cooking. The shrinkage in producing crops for human consumption includes plant and animal wastes not consumed by humans, whether or not these waste products can be utilized as byproducts by animals or used as raw material for manufacture of non-foodstuffs. Further shrinkage in weight due to cooking or waste left on the plate is not included in the calculations.

18. Water inputs in animal production as corrected for shrinkage include the water used for drinking, washing, processing, and for growing animal feed.

19. The period of agricultural production analyzed for water inputs is as follows:

    a. Annual plants: Planted acreage from time of seed planting to harvest of crop and may include pre-irrigation or natural precipitation.

    b. Perennial evergreen plants: 365 days per year for mature plants (including bearing trees). In some regions the "growing season" or irrigation season" may be less than 365 days. The water inputs for trees before they reach production has not been included. (See Appendix D, for methodology used to calculate specific crops, egs. alfalfa, citrus, irrigated pasture.)

    c. Deciduous trees: Growing season only. The water inputs for trees before they reach production has not been included.

    d. Egg (chicken) production: From time of hatch to slaughter, with inputs until egg production prorated in proportion to the total number of eggs laid in a lifetime.

    e. Poultry (chicken) meat production: From time of hatch to slaughter.

    f. Beef (meat) products from cattle raised solely for beef production: Brood cow during calf gestation and nursing from beginning of second or later pregnancy until next breeding cycle; calf maturation from birth to slaughter, water inputs to maintain the breeder bull are prorated per calves sired. Inputs for replacement heifers are not included.

g. Dairy (beef) products: Maintenance of mature cow in dairy herd during milk production as well as dry periods; inputs to the female calf from time of birth to a cow in the milk producing dairy herd, until entering dairy herd, are prorated over the total milk production of the dairy cow; water inputs to maintain the active breeder bull are prorated by the total milk produced by the daughters.

20. In this study the amounts of water used to produce an edible pound and an edible serving are calculated according to the weight of uncooked, but home trimmed, food.

Chart E.2 Gallons Water Use Per Pound Home Prepared Food

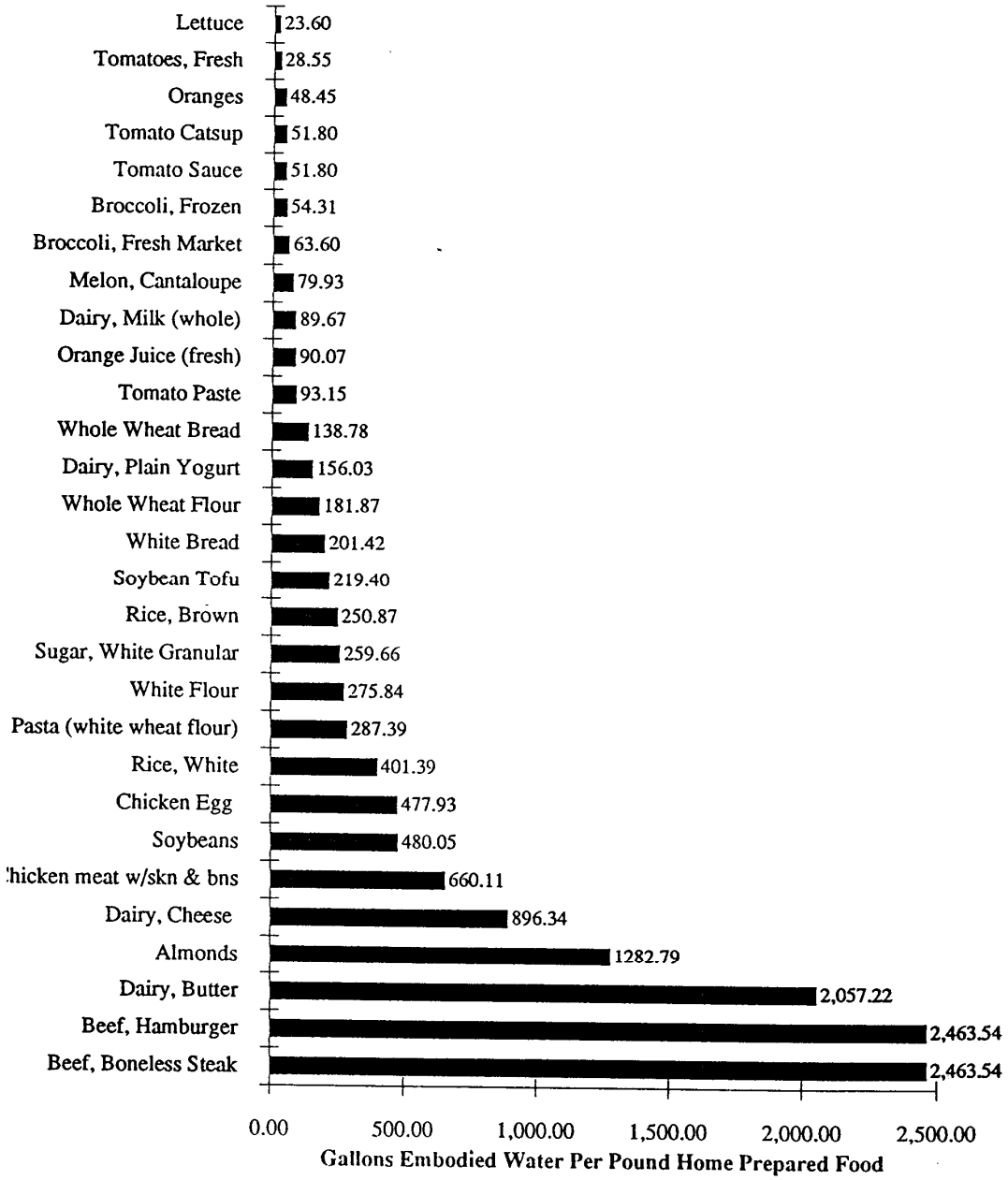

Chart E.3 Gallons Water Use Per Typical Home Serving

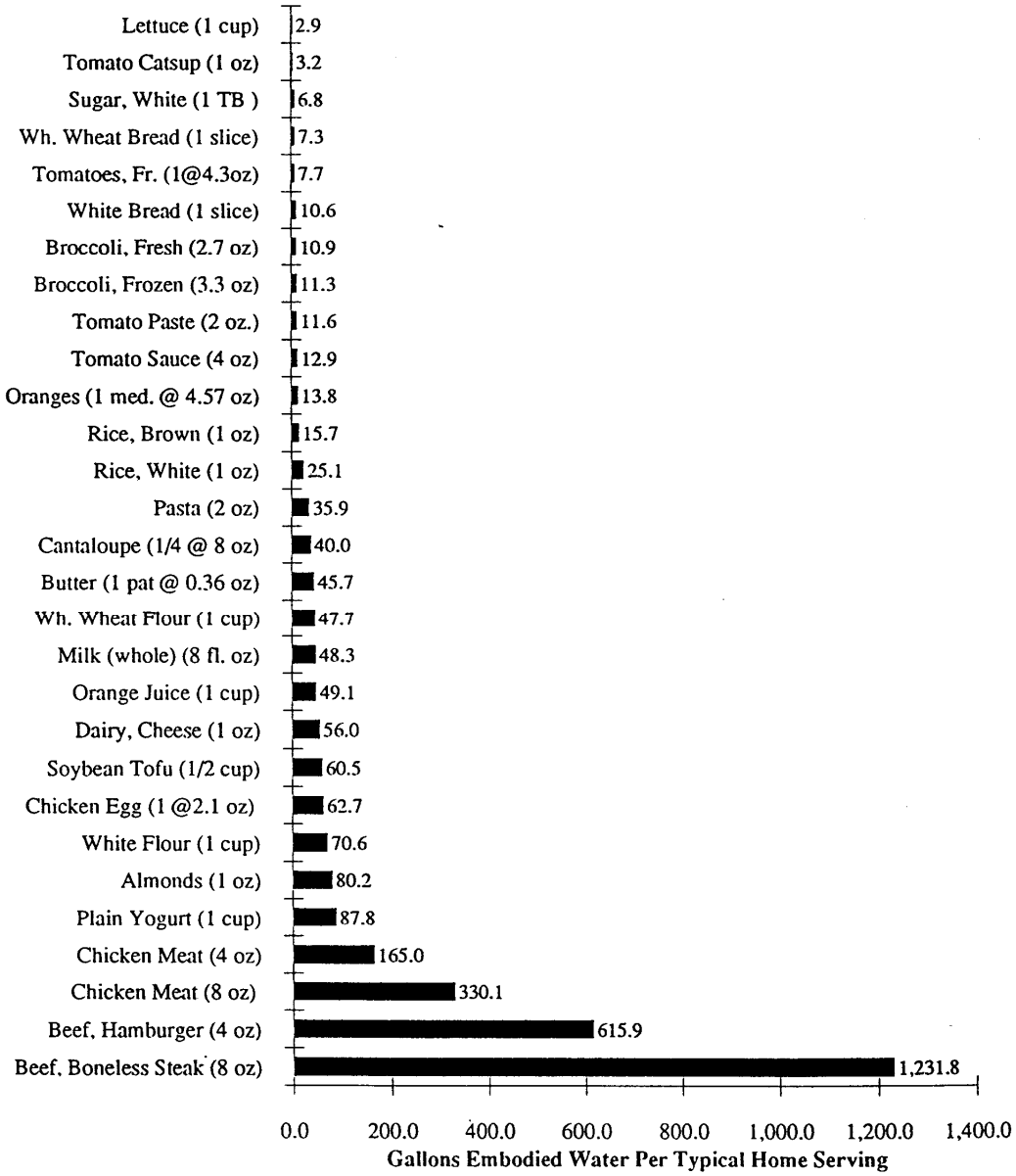
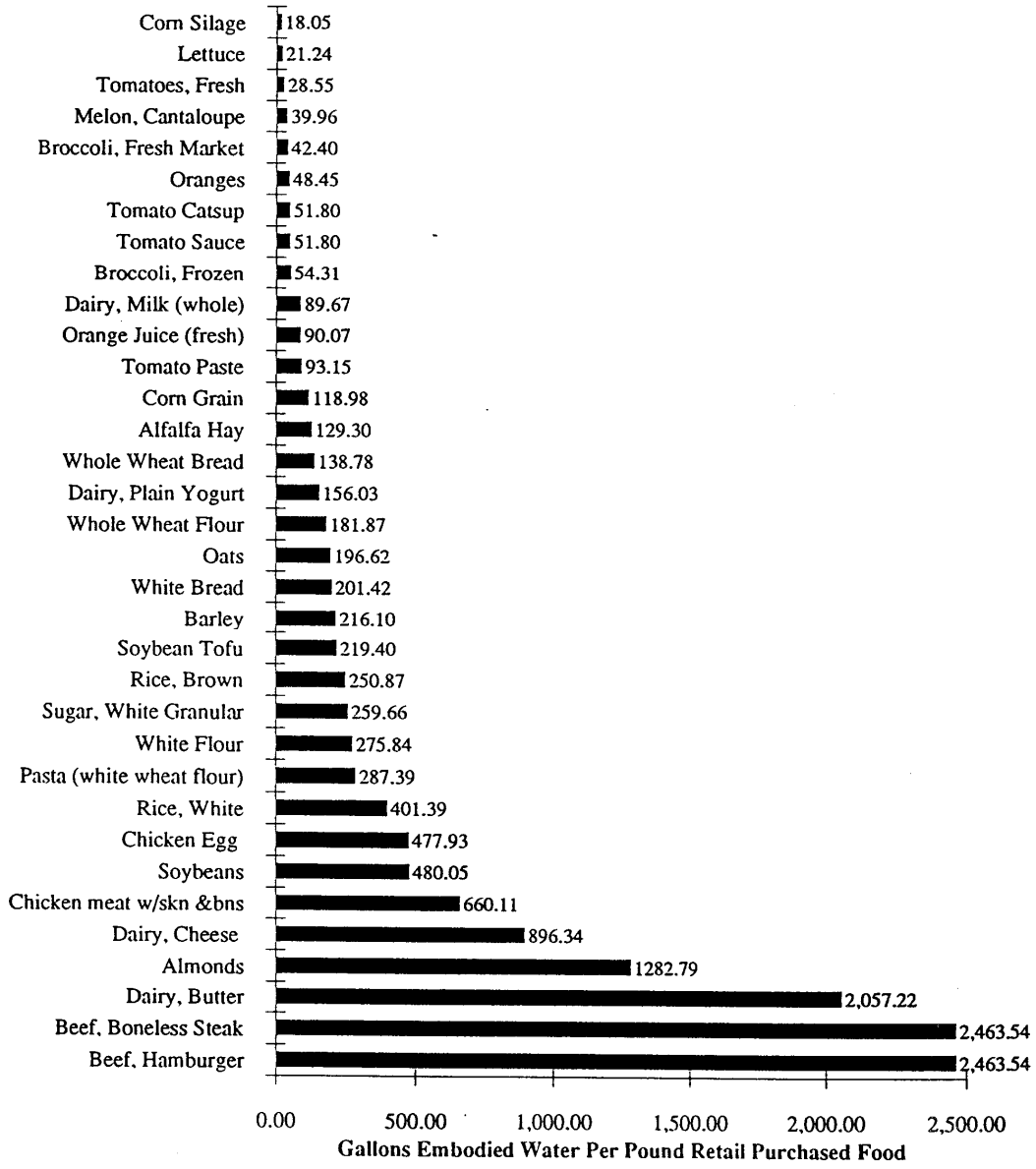
Chart E.4 Gallons Water Use Per Pound Retail Purchased Food