A Tale of Two Tomatoes

Facts & Footnotes

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Oligopoly?

F Four companies control 80 percent of U.S. beef packing.

> "Beef Packers CR4=81% (CR4 is the concentration ratio of the top four firms in a specific food industry.)"
> — **Hendrickson, M. and W. Heffernan (2002). "Concentration of Agricultural Markets." Department of Rural Sociology, University of Missouri.** http://www.agribusinesscenter.org/docs/Ag_Processing_Inc._1.pdf

F Five control 75 percent of the global grain trade.

> "At the international trade level the five largest commodity trading companies control about 75% of the grains market."
> — **Global Forum on Agricultural Research (2000). "Agriculture in the Early XXI Century: Agrodiversity and Pluralism as a Contribution to Address Issues on Food Security, Poverty and Natural Resource Conservation." Global Forum on Agricultural Research, p.14.**
> http://www.egfar.org/documents/conference/GFAR_2000/gfar08.PDF

F Five control 64 percent of the global agricultural chemical market.

> Top 10 Agrochemical Companies chart.
> — **ETCgroup Communique Issue #71 (2001). "Globalization, Inc. Concentration in Corporate Power: The Unmentioned Agenda." ETCgroup, July/August.** http://www.etcgroup.org/documents/com_globilization.pdf

F As farm sizes increase, community health takes a dismal turn: there's less employment, more absentee ownership, and higher levels of poverty.

> "In the US, the crucial question was asked more than half a century ago: what does the growth of largescale, industrial agriculture mean for rural towns and communities? Walter Goldschmidt's classic 1940s study of California's San Joaquin Valley compared areas dominated by large corporate farms with those still characterised by smaller family farms. In farming communities dominated by large corporate farms, Goldschmidt found, nearby towns died off. Mechanisation meant that fewer local people were employed, and absentee ownership meant that farm families themselves were no longer to be found. In these corporate-farm towns, the income earned in agriculture was drained off into larger cities to support distant enterprises, while in towns surrounded by family farms, the income circulated among local business establishments, generating jobs and community prosperity. Where family farms predominated, there were more local businesses, paved streets and sidewalks, schools, parks, churches, clubs and newspapers, better services, higher employment and more civic participation. Studies conducted since Goldschmidt's original work confirm that his findings remain true today."
> — **Rosset, P. (1999). "Small Is Bountiful."** ***The Ecologist*****, v.29, i.8 (December).**
> http://www.mindfully.org/Farm/Small-Farm-Benefits-Rosset.htm
> — **Goldschmidt, W. (1978).** ***As You Sow: Three Studies in the Social Consequences of Agribusiness.*** **New Jersey: Allenheld, Osmun and Company.**
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> "A tremendous amount of attention and research has been devoted to the impacts of farm scale on rural communities. The majority of this research follows in the 'Goldschmidt' tradition… In addition to generating academic research, concerns over structural change in U.S. agriculture have also generated public policies… The laws, called anti-corporate farming laws, vary from state to state but in general are intended to hobble or restrict

corporate involvement in agriculture in order to protect family farm agriculture… To test the impacts of the anti-corporate farming laws we construct two variables: a binary variable for whether a state has such a law or not; and a restrictiveness index that allows us to compare states with more restrictive laws to those with less restrictive laws. In addition, a number of control variables are included in the analysis… Rural community welfare is measured by three variables: percent of families in poverty, percent unemployed and percentage of farms in a county realizing cash gains… The results of the analysis indicate that, in general, agriculture dependent counties in states with anti-corporate farming laws fared better (less families in poverty, lower unemployment and higher percentages of farms realizing cash gains) than agriculture dependent counties in states without such laws."

— **Welsh, R. and T. Lyson (2001). "Anti-Corporate Farming Laws, the 'Goldschmidt Hypothesis' and Rural Community Welfare." Friends of the Constitution.** http://www.i300.org/anti_corp_farming.htm

"The 'diseconomies of scale' extend beyond the farmgate to affecting the farming community. There is a substantial body of literature that suggests that large-scale agricultural production does not bode well for conditions in farming communities. University of California anthropologist Dean MacCannell wrote, 'As farm size and absentee ownership increase, social conditions in the local community deteriorate. We have found depressed median family incomes, high levels of poverty, low education levels, social and economic inequality between ethnic groups, etc... associated with land and capital concentration in agriculture... Communities that are surrounded by farms that are larger than can be operated by a family unit have a bi-modal income distribution, with a few wealthy elites, a majority of poor laborers, and virtually no middle class. The absence of a middle class at the community level has a serious negative effect on both the quality and quantity of social and commercial service, public education, local governments, etc.'"

— **USDA National Commission on Small Farms (1998). "A Time to Act." United States Department of Agriculture, p.19.** http://www.reeusda.gov/smallfarm/smlfrm1.pdf

— **MacCannell, D. (1983). "Agribusiness and the Small Community." Background paper to "Technology, Public Policy and the Changing Structure of American Agriculture." U.S. Office of Technology Assessment.**

F It's no wonder farmers are having a tough time when they receive just 21 cents of your food dollar - the rest goes to advertising, distribution, and middlemen.

"Consumers spent $561 billion for food produced on U.S. farms in 1997. This amount includes purchases of farm foods in grocery stores (which account for about 60 percent of total consumer food expenditures) and at away-from-home eating places. Seventy-nine percent of this total, or $441 billion, went to pay the marketing bill. The remaining 21 percent of 1997 food spending went to farmers, who received about $120 billion for food commodities.."

— **Elitzak, H. (1999). "Food Cost Review, 1950-97." Economic Research Service, U.S. Department of Agriculture, p.14.** http://www.ers.usda.gov/publications/aer780/aer780.pdf

Keeping Dollars at Home

F One study shows that each dollar spent with a local food business is worth $2.50 for the community.

"We recently compared the multiplier effects of shopping for fruit and vegetables in a supermarket and from a local organic 'box scheme' (CSA). The results showed that every £10 spent with the box scheme was worth £25 for the local area, compared with just £14 when the same amount was spent in a supermarket."

— **Ward, B. and J. Lewis (2002). "Plugging the Leaks: Making the most of every pound that enters your local economy." New Economics Foundation, p.20.**
http://www.neweconomics.org/uploadstore/pubs/PTL%20handbook.pdf

Genetically Engineered?

F In fact, we eat foods with GE ingredients without even knowing it … they're in everything from baby food to granola bars.

The True Food Shopping List includes five brands of GE-ingredient baby foods and three of granola or energy bars, along with hundreds of other items.

— **True Food Shopping List webpage (as of July 2003). Greenpeace True Food Network.** http://www.truefoodnow.org/gmo_facts/product_list/pf-list.html

F Many countries insist on the labeling of GE foods, but not the U.S.

"On July 2, the European Parliament passed legislation calling for detailed labeling of genetically modified (GM) food products. You'd think Washington would be pleased. After all, the new laws will pave the way for American GM products to be sold within the European Union, ending a five-year ban. By the start of next year, European authorities will require all food, from pizza to potato chips, containing as little as 0.9% GM ingredients to be clearly labeled as such."

— **Capell, K. (2003). "Commentary: A Food Fight the U.S. Is Sure to Lose."** ***Business Week*****, 21 July.** http://www.businessweek.com/magazine/content/03_29/b3842141_mz034.htm

"China's implementation of labelling for GE (genetically engineered) foods today brings to two billion the number of people worldwide whose country's require GE labelling."

— **Greenpeace webpage (2002). "China introduces compulsory labelling of GE foods." Greenpeace, 01 July.** http://production.greenpeace.org/news/details?item_id=15856&campaign_id=3942

Pesticides!

F Most Americans have traces of half a dozen pesticides in their urine.

"In order to estimate the extent of exposure in the general population and as part of the 1994 National Health and Nutrition Examination Survey III (NHANES III), urine samples were collected from about a thousand adults selected from a broad spectrum of the U.S. population. Specimens were analyzed for twelve different chemical compounds that result from the metabolic breakdown of about thirty different pesticides with a detection limit of 1 µgm/liter urine. More than half the individuals tested had at least six of the pesticide residues in their urine."

— **Schettler, T., Solomon, G., Valenti, M., and A. Huddle (1999).** ***Generations at Risk*****. Cambridge, MA: MIT Press, p. 114.**

— **National Center for Environmental Health (2003). Second National Report on Human Exposure to Environmental Chemicals. Department of Health and Human Services, Centers for Disease Control and Prevention, p. 139-234.** http://www.cdc.gov/exposurereport/pdf/SecondNER.pdf

F They wind up in the air of nearby residential areas, in the streams flowing out of farm country, and in the produce we eat.

"New analysis of pesticide drift in this report reveals that several widely used pesticides are regularly found far from their application sites at concentrations that significantly exceed acute and chronic exposure levels deemed 'safe' by regulatory agencies... Analysis of pesticide air monitoring results and pesticide use data indicates that hundreds of thousands of Californians live where they are at risk of ill health from pesticide drift."

— **Kegley, S., Katten, A., and M. Moses (2003). "Secondhand Pesticides: Airborne Pesticide Drift in California." Californians for Pesticide Reform.** http://www.panna.org/resources/documents/SecondhandPs0ExSum.pdf

"NAWQA findings indicate that streams and ground water in basins with significant agricultural or urban development, or with a mix of these land uses, almost always contain complex mixtures of nutrients and pesticides... At least one pesticide was found in almost every water and fish sample collected from streams and in more than one-half of shallow wells sampled in agricultural and urban areas. Moreover, individual pesticides seldom occurred alone. Almost every sample from streams and about one-half of samples from wells with a detected pesticide contained two or more pesticides."

— **National Water Quality Assessment Program (1999). "The Quality of Our Nation's Waters: Nutrients and Pesticides." U.S. Geological Survey, p. 6.** http://water.usgs.gov/pubs/circ/circ1225/pdf/national.pdf

"In 2001, a total of 2,101 domestic and 4,374 import samples was collected and analyzed. Pesticide residues were detected in 39.8% of the domestic samples and in 28.0% of the import samples."

— **Food and Drug Administration Pesticide Program (2001). "Residue Monitoring 2001." U.S. Food and Drug Administration, p. 9.** http://www.cfsan.fda.gov/~acrobat/pes01rep.pdf

F Farm workers are on the front lines of this chemical warfare, suffering tens of thousands of poisonings each year.

"In 1999, the U.S. Environmental Protection Agency (EPA) estimated that, nationwide, there were 10,000 to 20,000 incidents of physician-diagnosed pesticide illnesses and injuries per year in farm work alone."

— **Stephenson, J. (2001). "Information on Pesticide Illness Reporting Systems." United States General Accounting Office, p. 1.** http://www.beyondpesticides.org/WATCHDOG/alerts/GAO_PIR_Testimony.pdf

F To top it off, these chemicals are becoming less effective over time. There's been a tenfold increase in both the amount and toxicity of insecticide use since the 1940s, but the share of the U.S. harvest lost to pests and insects has gone up, not down.

It's worth quoting at length from the balanced and thorough 1998 report by the International Food Policy Research Institute: "Pesticide use has been profitable for many farmers and economies. One estimate is that, in the United States in 1997, each US$1 invested in pesticides returned US$4, so that the US$6.5 billion invested in pesticides saved US$26 billion in crop losses (Pimentel 1997). All other things being equal, pesticides have been effective in reducing crop losses. However, despite the substantial increases in the volume and value of pesticide use since the 1950s, there appears to have been very little, if any, decline in the proportion of agricultural output being lost to pests. Some analyses indicate that there have actually been increases in the proportion of crop being lost to pests. According to Pimentel, data from the U.S. Department of Agriculture (USDA) show a 10-fold increase in both the amount and toxicity of insecticide use in the United States from the early 1940s to the 1990s. During the same period, though, crop losses from pests rose from 30 to 37 percent, losses from insects increased from 6 to 13 percent, and losses to plant pathogens from 10 to 12 percent, while losses from weeds decreased from about 14 per cent to 12 percent... The trend of an increasing proportion of crop output being lost to pests, despite a multi-billion-dollar investment in pesticides, appears to be a global phenomenon. Oerke et al. (1994) compared the estimates of global pest-induced losses between 1965 and 1990 for the eight major crops they studied. The comparison between Cramer 1965 and their own 1990 estimates showed that losses increased during the 25-year period for all crops except coffee, with wheat, potatoes, and barley suffering the largest increases in percentage lost… A partial explanation for the paradox is that the industrialization of agriculture and the reliance on agrochemicals has led to changed farming systems that have produced higher yields, but have also led to an increased vulnerability of crops to pests."

— **Yudelman, M., Ratta, A. and D. Nygaard (1998). "Pest Management and Food Production: Looking to the Future." International Food Policy Research Institute.** http://www.ifpri.org/2020/dp/dp25.pdf

Providing Save Haven

F These measures pay back in other ways as well - providing lands that offer livable habitat for fish, frogs and other animals.

"This report presents and reviews the findings of nine studies on the biodiversity supported by organic farming in the lowlands, compared to conventional farming systems... In most of the studies, important differences were found between the biodiversity on the organic and conventional farms, with generally substantially greater levels of both abundance and diversity of species on the organic farms… Plants: five times as many wild plants in arable fields, 57 per cent more species… Birds: 25 per cent more birds at the field edge, 44 per cent more in-field in autumn/winter… Invertebrates: 1.6 times as many of the arthropods that comprise bird food; three times as many non-pest butterflies in the crop areas; one to five times as many spider numbers and one to two times as many spider species… Crop pests: significant decrease in aphid numbers."

— **The Soil Association (2000). "The Biodiversity Benefits of Organic Farming." The Soil Association, p. 4.**

"A 15-member working group used modeling to predict the environmental and social benefits that could result from changing agricultural land use practices in two Minnesota watersheds. These quantitative and qualitative public (nonmarket) benefits include improved water quality, less soil erosion, enhanced soil quality, increased wildlife habitat and social capital formation, as well as toxic chemical and greenhouse gas reductions… In the Wells Creek watershed, diversifying the agricultural system would reduce lethal fish events by more than half."

— **Boody, G. and M. Krinke (2001). "The Multiple Benefits of Agriculture: An Economic, Environmental & Social Analysis." Land Stewardship Project, p. 1-2.** http://www.landstewardshipproject.org/mba/mba_executive_summary.pdf

"We report results from a 21-year study of agronomic and ecological performance of biodynamic, bioorganic, and conventional farming systems in Central Europe… One of the particularly remarkable findings was a strong and significant increase in microbial diversity… The improvement of biological activity and biodiversity below and above ground in initial stages of food webs in the DOK trial is likely to provide a positive contribution toward the development of higher food web levels including birds and larger animals."

— **Mäder, P., et al. (2002). "Soil Fertility and Biodiversity in Organic Farming."** ***Science*****, v. 296, 31 May, p. 1694-7.**

"During the 3-year study, 28,590 birds were counted on 153 agricultural fields. Between 11 and 70 different species were identified during the four seasons. In general, bird populations benefited from minimum-tillage and organic farming systems in comparison with conventional farming. There were generally more species and higher densities of birds and nests on minimum tillage and organic fields than on conventional fields."

— **Lokemoen, J. and J. Beiser (2001). "Bird Use of Minimum-tillage, Organic, and Conventional Cropland in Southeast North Dakota." Northern Prairie Science Center.** http://www.mandakzerotill.org/book17/birds.html

Overdrawn!

F Across the nation, we're losing soil 17 times faster than it naturally replaces itself.

"Soil erosion rates are highest in Asia, Africa, and South America, averaging 30 to 40 tons ha^{-1} $year^{-1}$ and lowest in the Untied States and Europe, averaging about 17 tons ha^{-1} $year^{-1}$. The relatively low rates in the United States and Europe, however, greatly exceed the average rate of soil formation of about 1 ton ha^{-1} $year^{-1}$ (the rate of conversion of parent material into soil in the A, E, and B horizons.)"

— **Pimentel, D., et al. (1995). "Environmental and Economic Costs of Soil Erosion and Conservation Benefits."** ***Science*****, v. 267, 24 February, p. 1117.**

F But fertilizers don't stay on the farm; they pollute the groundwater and are washed downstream to bays and estuaries, where they are a primary cause of low-oxygen zones that are deadly for fish.

"NAWQA findings indicate that streams and ground water in basins with significant agricultural or urban development, or with a mix of these land uses, almost always contain complex mixtures of nutrients and pesticides... Health risks increase in those aquifers located in geologic settings, such as sand, gravel, or karst (weathered carbonate rock), that enable rapid movement of water. The most prevalent nitrate contamination was detected in shallow ground water (less than 100 feet below land surface) beneath agricultural and urban areas. This finding raises potential concerns for human health, particularly in rural agricultural areas where shallow ground water is used for domestic water supply."

— **National Water Quality Assessment Program (1999). "The Quality of Our Nation's Waters: Nutrients and Pesticides." U.S. Geological Survey, p. 6.** http://water.usgs.gov/pubs/circ/circ1225/pdf/national.pdf

"This report presents the results of a National Assessment Workshop held in August 1998 to address the problem of estuarine eutrophication... It covers 138 estuaries, representing over 90 percent of the estuarine surface area of the coterminous United States, plus the Mississippi River Plume... 82 estuaries, representing 67% of estuarine surface area, exhibit moderate to high expressions of at least one of the following symptoms: depleted dissolved oxygen, loss of submerged vegetation, and nuisance/toxic algal blooms... Eutrophication refers to a process in which the addition of nutrients to water bodies, primarily nitrogen and phosphorus, stimulates algal growth. This is a natural process, but it has been greatly accelerated by human activities. Estuaries have always received nutrients from natural sources in the watershed and from the ocean. In recent decades, however, population growth and related activities, such as various agricultural practices, wastewater treatment plants, urban runoff, and the burning of fossil fuels, have increased nutrient inputs by many times the levels that occur naturally."

— **Bricker, S. et al. (1999). "National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation 's Estuaries." National Ocean Service, National Oceanic and Atmospheric Administration, p. 7-10.** http://spo.nos.noaa.gov/projects/cads/nees/Eutro_Report.pdf

F Over 75 percent of our water use in both Oregon and California goes to farms, and in California that means a deficit for the state's aquifers of 475 billion gallons a year.

Note: At the time of printing the California Water Plan Update 2003 is not yet available, and so these numbers refer to the 1998 Update. Table ES4-3 estimates total statewide urban water use as 8,770 taf, and Table ES4-6 estimates total statewide agricultural water use as 33,780 taf. Table ES3-2 estimates the total statewide groundwater overdraft as 1,460 taf (=475.7 billion gallons).

— **Department of Water Resources (1998). "California Water Plan Update Bulletin 160-98." Department of Water Resources, p. ES3-7.** http://rubicon.water.ca.gov/pdfs/b160cont.html

An Oregon Water Resources Department database query in October 2001 reports that statewide 77% of surface water use and 84% of groundwater use goes to irrigation. Non-agricultural irrigation uses were stated by Technical Services Division Administrator Barry Norris to be "very minor".

— **Email and telephone discussion with Oregon Water Resources Department Technical Services Division Administrator Barry Norris.**

Balancing the Books

F Drip irrigation - feeding water directly to the soil through tubing - has been shown to cut water use and in many cases increase crop yields as well.

"Today, more than 60,700 hectares [in India] are brought under irrigation covering more than 30 crops. Farmers from various places communicated their experiences of drip irrigation on various crops like sugarcane, cotton, grapes, banana, pomegranate, vegetables, tea, ber*, flowers, etc. The increase in yield as compared to conventional irrigation methods is from 20 to 100%, whereas saving in water ranges from 40% to 70%."

— **Suryawanshi, S. (1995). "Success of Drip in India: An Example to the Third World." Proceedings of 5th International Microirrigation Congress, p. 347-352.** http://www.microirrigationforum.com/new/archives/india.html

"The advantages and disadvantages of subsurface drip irrigation (SDI) as compared to alternative irrigation systems are conceptually discussed… Advantages related to water and soil issues: More efficient water use - Soil evaporation, surface runoff, and deep percolation are greatly reduced or eliminated... The inherent ability to apply small irrigation amounts can allow better water-efficient decisions about irrigation events near the end of the cropping season. In widely spaced crops, a smaller fraction of the soil volume can be wetted, thus further reducing unnecessary irrigation water losses. Less water quality hazards - Runoff into streams is reduced or eliminated, and there is less nutrient and chemical leaching due to deep percolation... Enhanced plant growth, crop yield and quality - A number of crops respond positively. Improved plant health - Less disease and fungal pressure occurs due to drier and less-humid crop canopies."

— **Lamm, F. (2002). "Advantages and Disadvantages of Subsurface Drip Irrigation." Kansas State University, p. 1-2.** http://www.oznet.ksu.edu/sdi/Reports/2002/ADofSDI.pdf

F And farming practices such as planting cover crops and leaving crop residue on fields - common tools in the organic farmer kitbag - nourish the soil and protect its long-term health as well.

"We compare the long-term effects (since 1948) of organic and conventional farming on selected properties of the same soil. The organically-farmed soil had significantly higher organic matter content, thicker topsoil depth, higher polysaccharide content, lower modulus of rupture and less soil erosion than the conventionally-farmed soil."

— **Reganold, J., Elliott, L., and Y. Unger (1987). "Long-term Effects of Organic and Conventional Farming on Soil Erosion." *Nature*, v. 330, 26 November, p. 370-372.**

"Here we report the sustainability of organic, conventional and integrated apple production systems in Washington State from 1994 to 1999. All three systems gave similar apple yields. The organic and integrated systems had higher soil quality and potentially lower negative environmental impact than the conventional system."

— **Reganold, J., Glover, J., Andrews, P. and H. Hinman (2001). "Sustainability of Three Apple Production Systems." *Nature*, v. 410, 19 April, p. 926-929Z.**

Gassed!

F In order to better survive the long journey to market, many tomatoes are picked while hard and green, then they're gassed with a hormone to help them ripen.

"Bush-grown, fresh-market tomatoes are hand-harvested when 10 to 15 percent of the fruit is red... The minimum harvest maturity level is a mature green 2 (MG2)... Cartons of fruit are typically stored in a temperature-controlled chamber for 1 to 10 days and subjected to an ethylene treatment prior to shipment to market."

— **Le Strange, M., Schrader, W., and T. Hartz (2000). "Fresh-Market Tomato Production in California." University of California, p. 6.** http://anrcatalog.ucdavis.edu/pdf/8017.pdf

1500 miles!

F 1500 miles from field to fork – that's the trek made by the average fruit or vegetable these days.

"A Weighted Average Source Distance (WASD) can be used to calculate a single distance figure that combines information on the distances from producers to consumers and amount of food product transported. U.S. Department of Agriculture Agricultural Marketing Service produce arrival data from the Chicago, Illinois terminal market were examined for 1981, 1989, and 1998, and a WASD was calculated for arrivals by truck within the continental United States for each year. Produce arriving by truck traveled an average distance of 1,518 miles to reach Chicago in 1998, a 22 percent increase over the 1,245 miles traveled in 1981. A WASD was calculated for a sampling of data from three Iowa local food projects where farmers sold to institutional markets such as hospitals, restaurants, and conference centers. The food traveled an average of 44.6 miles to reach its destination, compared with an estimated 1,546 miles if these food items had arrived from conventional national sources."

— **Pirog, R., Van Pelt, T., Enshayan, K. and E. Cook (2001). "Food, Fuel, and Freeways: An Iowa perspective on how far food travels, fuel usage, and greenhouse gas emissions." Leopold Center for Sustainable Agriculture, p. 1.** http://www.leopold.iastate.edu/pubinfo/papersspeeches/ppp/intro.html

F Nine percent of America's total energy consumption is used to produce, process and transport our foods.

John Hendrickson has identified and compared the results of eight reports that calculate the total energy used in the U.S. food system. According to his average of their findings, the production, processing, and transportation components of the system account for 9.14% of America's total energy consumption.

— **Hendrickson, J. (1997). "Energy Use in the U. S. Food System: A Summary of Existing Research and Analysis." Center for Integrated Agricultural Systems, University of Wisconsin-Madison.**