

CHARLES M. BENBROOK

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PERSONAL INFORMATION

Birthdate: November 26, 1949
Place: Los Angeles, California
Children: Stephen, Rachel, Michael, Seth and Zacary
Wife: Karen Lutz Benbrook
Hobbies: Fishing, Music

EDUCATION

B.A. Degree - Economics, Harvard University (1971)
M.A. Degree - Agricultural Economics, University of Wisconsin (1979)
Ph.D. - Agricultural Economics, University of Wisconsin (1980)

EMPLOYMENT HISTORY

Heartland Health Research Alliance, LTD, Executive Director. October 1, 2020 to present.

Founded new 501(c)3 non-profit to conduct cutting-edge science and policy around how food and food systems impact public and environmental health. Provide scientific, funding, and management support for HHRA's flagship project The Heartland Study, a multi-center birth cohort study on the impacts of glyphosate exposure on pregnancy, childbirth, and child development. Oversee an elite, multi-disciplinary team of scientists and communicators to conduct and disseminate research, with a goal of enacting meaningful policy changes that support public health.

Benbrook Consultant Services (BCS), President. December 1, 1990 to present.

Analytical services for domestic and international clients in the public and private sectors. Areas of focus include biotechnology; pesticide use, risks, and regulation; adoption and costs-benefits of Integrated Pest Management; impacts of federal environmental and food laws, especially the Food Quality Protection Act of 1996. BCS specializes in the development of novel methodologies to assess environmental and public health risks and issues.

Washington State University, Center for Sustaining Agriculture and Natural Resources, Research Professor. August 16, 2012 to May 15, 2015.

Adjunct Faculty, Department of Crop and Soil Sciences, Washington State University, October 31, 2007 to August 26, 2015

Research scientist and program leader for the “Measure to Manage Program – Farm and Food Diagnostics for Sustainability and Health.”

The Organic Center, Chief Scientist. January 1, 2006 to May 31, 2012.

Developed and managed a program of research on the environmental and consumer health benefits of organic foods and farming.

Last updated: November 30,

National Research Council/National Academy of Sciences, Washington, D.C. Executive Director, Board on Agriculture. January 16, 1984 to November 30, 1990.

Responsible for overseeing and managing activities of the Board. Major BA/NAS reports published during this period addressed the methods and applications of agricultural biotechnology; unique risks faced by infants and children from pesticide exposure; resistance to pesticides; options to improve the nutritional composition of animal products; and, agricultural research and education.

Subcommittee on Department Operations, Research, and Foreign Agriculture, Committee on Agriculture, U.S. House of Representatives. Subcommittee chaired by Congressman George E. Brown, Jr., Staff Director. February 1981 - January 13, 1984.

Responsibilities included: (i) preparing and analyzing legislation within the jurisdiction of the subcommittee; (ii) organizing subcommittee hearings and business meetings; and, (iii) briefing members and staff on legislation and oversight activities.

Council on Environmental Quality, Executive Office of the President, Agricultural Policy Analyst. December 1979 - January 1981.

Represented CEQ on various Executive Branch committees; analyzed natural resource data and policy options; and (iii) conducted research and contributed to multiple Executive Branch reports.

AWARDS and HONORS

Visiting Scholar, Bloomberg School of Public Health, Johns Hopkins University, March 31, 2017- June 30, 2018

Visiting Professor, Newcastle University, Newcastle, U.K. 2016 - Present

Excellence in Science Award, OTA/TOC Dinner, March 2014.

Appointed as member, USDA's AC 21 agricultural biotechnology advisory committee, 2010, and reappointed in 2013.

Appointed to AGree Advisory Committee, 2010.

Appointed as Adjunct Faculty Member, Department of Crop and Soil Sciences, Washington State University, Pullman, Washington, 2007.

Graduated cum laude from Harvard University, 1971.

Received \$1,000 cash award from the Council on Environmental Quality for contributions to the completion of the National Agricultural Lands Study.

LITIGATION HISTORY

In addition to the above activities, Benbrook has participated in several lawsuits involving pesticide use and risks, agricultural biotechnology, and food labeling. The major cases are listed below:

1. Peterson, et al. v. BASF Corp. Plaintiff's attorney, Hugh Plunkett, Lockridge Grindal Nauen, St. Paul, Minnesota. Trial Ada, Minnesota, in the District Court for Northeastern Minnesota (Red River Valley)
2. James E. Fox, et al. v. Cheminova, Inc USDC, EDNY Case Number CV 00-5145, plaintiff's attorney Kevin Huddel, Jones, Verras, and Freiberg, LLC, New Orleans, Louisiana.
3. Ricardo Ruiz Guzman individually, Martin Martinez individually, and Miguel Farias and Ignacia Farias, husband and wife v. Amvac Chemical Corporation. Plaintiff's attorney, Richard Eymann, Eymann, Allison, Hunter, Jones, P.S., Spokane, Washington.
4. United Industries v. Dow AgroSciences. Plaintiff's attorney, Dudley Von Holt, Thompson Coburn LLP, St. Louis, Missouri.
5. Hardin, et al. v. BASF, U.S. District Court for the Eastern District of Arkansas. Plaintiff's attorney, William French, Looper Reed and McGraw, Dallas, Texas.
6. Timm Adams, et al. vs. U.S.A., et al., Idaho U.S.D.C. Case No. CIV 03-049-E-BLW, Plaintiff's attorneys, Holland and Hart, Boise, ID and Denver, CO.

7. Jim Aana, et al., vs. DuPont Pioneer and Gay Robinson, Inc. Civil No. CV12 00231 – LEK-BMK, United States District Court, District of Hawaii.
8. Conagra Foods, Inc, Case re Wesson oils, No. 11-cv-05379-MMM, U.S. District Court Central District of California Western District.
9. Laura Eggatz, Katrina Garcia, and Julie Martin v. Kashi Company. Civil Case No.: 12-21678-CIV-Lenardo/O’Sullivan, U.S. District Court, Southern District of Florida, Miami Division.
10. Grocery Manufacturers Association et al. Plaintiffs, v. William H. Sorrell, Attorney General of Vermont, et al., Case No. 5:14-cv-117, United States District Court for the State of Vermont.
11. Barron v. Snyder’s-Lance, Inc. No. 0:13-cv-62496-Leonard-Goodman (S.D. Fla.).
12. In re General Mills, Inc. Kix Cereal Litigation, Case No. 12-249 (KM) (JBC), U.S. District Court of New Jersey
13. Dewayne Johnson v. Monsanto Company, Case No. CGC-16-550128, Superior Court State of California County of San Francisco, and other federal and state cases involving glyphosate and NHL.

RESEARCH and ANALYTICAL ACTIVITIES

1979-1983: Basic analytical work on the extent and distribution of soil erosion, findings used in development of the conservation provisions in the 1985 farm bill.

1981- 1983: Congressional oversight investigation of the pesticide regulatory activities of the Environmental Protection Agency, wrote a three-volume subcommittee report: "EPA Pesticide Regulatory Study." The report's findings and recommendations set in motion activities that led to the 1984-1987 NAS report *Regulating Pesticides in Food: The Delaney Paradox* (1987), the seminal 1993 NAS report *Pesticides in the Diets of Infants and Children*, and passage of the "Food Quality Protection Act" in 1996.

1988-1989: Compiled data and conducted analysis of private sector research investments in the food and agricultural industries, leading to Appendix B, "Private Sector Research Activities and Prospects", in *Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System*, NAS Press, 1989.

1995-2000: Developed the first system in the U.S. that quantifies the level of adoption of Integrated Pest Management along the "IPM continuum." This early model of IPM adoption has

been refined and augmented through several iterations and applications in multiple projects, some of which are ongoing.

1999-2004: Developed a method to estimate the usage of subtherapeutic antimicrobials in livestock production for growth promotion and disease prevention. Did the analytical work and was principle author of the Union of Concerned Scientists' report *Hoggin It! Estimates of Antimicrobial Abuse in Livestock* (2001).

2004-June 2012: Developed the "Nutritional Quality Index" (NQI), a food nutritional profiling system encompassing 26 essential nutrients. For the first time ever, applied the system to all foods consumed in a day by an individual. Utilized model in assessment of the fatty acid profile of organic versus conventional whole milk.

2013-2014: Posted on the M2M website at Washington State University interactive systems allowing access to: (i) USDA pesticide use data by crop, state, and over time in the U.S., and (ii) detailed information on pesticide residues and risk levels in food, for organic and conventional food, and imported foods and domestic production.

2016-present: Developed and made available online interactive lookup tables analyzing pesticide use and residue data: (i) Pesticide Use Data System (PUDS) providing access to detailed information on pesticide use by crop and year, at the national and state level. The system draws upon pesticide use data collected and published annually by the USDA's National Agricultural Statistics Service (NASS), via their online Quick Stats Database. And (ii) the Dietary Risk Index (DRI), a complex analytical system that quantifies the relative risks stemming from pesticides in food; by food, by pesticide, and as a function of the farming system and country of origin. The DRI relies on U.S. Environmental Protection Agency (EPA) data on pesticide toxicity, and pesticide residue data from the U.S. Department of Agriculture (USDA), and United Kingdom-Food Standards Agency (UK-FSA) data. See the PUDS at <https://hygeia-analytics.com/pesticides/usage/puds-the-pesticide-use-data-system/> and the DRI at <https://hygeia-analytics.com/pesticides/dietary-risks/dietary-risk-index/>.

PEER-REVIEWED PUBLICATIONS, REPORTS, PRESENTATIONS and ARTICLES

Benbrook has published over 40 articles in peer reviewed journals, spanning multiple disciplines including agricultural biotechnology, pesticide use and residues in food, soil and water conservation, pesticide risk assessment methods, Integrated Pest Management, nutrition, germplasm conservation, scientific basis for evaluating agricultural technologies, antibiotic use and resistance, food safety, international agricultural development, sustainable agriculture, and agricultural policy. See <https://hygeia-analytics.com/about/who-we-are/#publications> for a list of publications with links to full text where available.

Peer Reviewed Papers

- Benbrook, Charles M., & Davis, Donald R.; "The dietary risk index system: a tool to track pesticide dietary risks;" *Environmental Health*, 2020, 19(1); DOI: [10.1186/s12940-020-00657-z](https://doi.org/10.1186/s12940-020-00657-z).
- Mesnager, R, Benbrook, C, Antoniou M.N. "Insight into the confusion over surfactant co-formulants in glyphosate-based herbicides," *Food and Chemical Toxicology*, 2019, 128:137-145. <https://doi.org/10.1016/j.fct.2019.03.053>
- Benbrook, Charles "How did the US EPA and IARC reach diametrically opposed conclusions on the genotoxicity of glyphosate-based herbicides?," *Environmental Sciences Europe*, 2019, 31(1). DOI: 10.1186/s12302-018-0184-7. <https://enveurope.springeropen.com/articles/10.1186/s12302-018-0184-7>.
- Benbrook, Charles, "Why Regulators Lost Track and Control of Pesticide Risks: Lessons From the Case of Glyphosate-Based Herbicides and Genetically Engineered-Crop Technology," *Current Environmental Health Reports*, 2018, 5(3), 387-395. DOI: 10.1007/s40572-018-0207-y. <https://www.ncbi.nlm.nih.gov/pubmed/30003510>.
- Benbrook, Charles, Davis, D. R., Heins, B. J., Latif, M. A., Leifert, C., Peterman, L., Butler, G., Faergeman, O., Abel-Caines, S., & Baranski, M., "Enhancing the fatty acid profile of milk through forage-based rations, with nutrition modeling of diet outcomes," *Food Science & Nutrition*, 2018, (3), 681-700. DOI: 10.1002/fsn3.610. <https://www.ncbi.nlm.nih.gov/pubmed/29876120>.
- Vandenberg, L. N., Blumberg, B., Antoniou, M. N., Benbrook, C. M., Carroll, L., Colborn, T., Everett, L. G., Hansen, M., Landrigan, P. J., Lanphear, B. P., Mesnager, R., Vom Saal, F. S., Welshons, W. V., & Myers, J. P., "Is it time to reassess current safety standards for glyphosate-based herbicides?," *Journal of Epidemiology and Community Health*, 2017, 71(6), 613-618. DOI: 10.1136/jech-2016-208463. <https://jech.bmj.com/content/jech/71/6/613.full.pdf>.
- Benbrook, Charles, "Enhancements Needed in GE Crop and Food Regulation in the U.S," *Frontiers in Public Health*, 2016, 4, 59. DOI: 10.3389/fpubh.2016.00059. <https://www.ncbi.nlm.nih.gov/pubmed/27066473>.
- Benbrook, Charles, "Trends in glyphosate herbicide use in the United States and globally," *Environmental Sciences Europe*, 2016, 28(1), 3. DOI: 10.1186/s12302-016-0070-0. <https://www.ncbi.nlm.nih.gov/pubmed/27752438>.

Myers, John Peterson, Antoniou, Michael N, Blumberg, Bruce, Carroll, Lynn, Colborn, Theo, Everett, Lorne G, Hansen, Michael, Landrigan, Philip J, Lanphear, Bruce P, Mesnage, Robin, Vandenberg, Laura N, Vom Saal, Frederick S, Welshons, Wade V, & Benbrook, Charles M, "Concerns over use of glyphosate-based herbicides and risks associated with exposures: a consensus statement," *Environmental Health*, 2016, 15, 19. DOI: 10.1186/s12940-016-0117-0. <https://www.ncbi.nlm.nih.gov/pubmed/26883814>.

Srednicka-Tober, D., Baranski, M., Seal, C., Sanderson, R., Benbrook, C., Steinshamn, H., Gromadzka-Ostrowska, J., Rembialkowska, E., Skwarlo-Sonta, K., Eyre, M., Cozzi, G., Krogh Larsen, M., Jordon, T., Niggli, U., Sakowski, T., Calder, P. C., Burdge, G. C., Sotiraki, S., Stefanakis, A., Yolcu, H., Stergiadis, S., Chatzidimitriou, E., Butler, G., Stewart, G., & Leifert, C., "Composition differences between organic and conventional meat: a systematic literature review and meta-analysis," *British Journal of Nutrition*, 2016, 115(6), 994-1011. DOI: 10.1017/S0007114515005073. <https://www.ncbi.nlm.nih.gov/pubmed/26878675>.

Srednicka-Tober, D., Baranski, M., Seal, C. J., Sanderson, R., Benbrook, C., Steinshamn, H., Gromadzka-Ostrowska, J., Rembialkowska, E., Skwarlo-Sonta, K., Eyre, M., Cozzi, G., Larsen, M. K., Jordon, T., Niggli, U., Sakowski, T., Calder, P. C., Burdge, G. C., Sotiraki, S., Stefanakis, A., Stergiadis, S., Yolcu, H., Chatzidimitriou, E., Butler, G., Stewart, G., & Leifert, C., "Higher PUFA and n-3 PUFA, conjugated linoleic acid, alpha-tocopherol and iron, but lower iodine and selenium concentrations in organic milk: a systematic literature review and meta- and redundancy analyses," *British Journal of Nutrition*, 2016, 115(6), 1043-1060. DOI: 10.1017/S0007114516000349. <https://www.ncbi.nlm.nih.gov/pubmed/26878105>

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Baranski, Marcin, Srednicka-Tober, Dominika, Volakakis, Nikolaos, Seal, Chris, Sanderson, Roy, Stewart, Gavin B, Benbrook, Charles, Biavati, Bruno, Markellou, Emilia, Giotis, Charilaos, Gromadzka-Ostrowska, Joanna, Rembialkowska, Ewa, Skwarlo-Sonta, Krystyna, Tahvonen, Raija, Janovska, Dagmar, Niggli, Urs, Nicot, Philippe, & Leifert, Carlo, "Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analyses," *British Journal of Nutrition*, 2014, 112(5), 794-811. DOI: 10.1017/S0007114514001366. <https://www.ncbi.nlm.nih.gov/pubmed/24968103>.

Benbrook, Charles, & Baker, Brian P., "Perspective on Dietary Risk Assessment of Pesticide Residues in Organic Food," *Sustainability*, 2014, 6, 3552-3570. DOI: 10.3390/su6063552.

https://res.mdpi.com/sustainability/sustainability-06-03552/article_deploy/sustainability-06-03552.pdf?filename=&attachment=1.

Benbrook, Charles, "Are organic foods safer or healthier?," *Annals of Internal Medicine*, 2013, 158(4), 296-297. DOI: 10.7326/0003-4819-158-4-201302190-00017.
<https://www.ncbi.nlm.nih.gov/pubmed/23420244>.

Benbrook, Charles, "Impacts of Changing Pest Management Systems and Organic Production on Tree Fruit Pesticide Residues and Risk," *Acta Horticulturae*, 2013.

Benbrook, Charles, Butler, Gillian, Latif, Maged A., Leifert, Carlo, & Davis, Donald R., "Organic production enhances milk nutritional quality by shifting fatty acid composition: A United States-wide, 18-month study," *Plos One*, 2013, 8, 1-13. DOI: 10.1371/journal.pone.0082429.

Benbrook, Charles "Impacts of genetically engineered crops on pesticide use in the U.S. -- the first sixteen years," *Environmental Sciences Europe*, 2012, 24. DOI: 10.1186/2190-4715-24-24.

Benbrook, Charles, "Genetically engineered crops increase pesticide use in United States.," *Pesticides News*, 2010, 12-14.

Benbrook, Charles, & Davis, Donald R, "Letter: Methodologic flaws in selecting studies and comparing nutrient concentrations led Dangour et al to miss the emerging forest amid the trees," *American Journal of Clinical Nutrition*, 2009, 90(6), 1700-1701; author reply 1701. <https://www.ncbi.nlm.nih.gov/pubmed/19846543>.

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<https://www.ncbi.nlm.nih.gov/pubmed/19394464>.

Benbrook, Charles, "Prevention, not profit, should drive pest management," *Pesticides News*, 2008, 82, 12-17.

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Benbrook, Charles, "Toward a "Reduced Risk" Pesticide Policy Worthy of the Name," *Outlooks on Pest Management*, 2006, 17(4), 181-184. DOI: 10.1564/17aug11.

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<http://dx.doi.org/10.1039/B305507H>.

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Baker, B P, Benbrook, C M, Groth, E, & Lutz Benbrook, K, "Pesticide residues in conventional, integrated pest management (IPM)-grown and organic foods: insights from three US data sets.," *Food Additives and Contaminants*, 2002, 19, 427-446. DOI: 10.1080/02652030110113799.

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Benbrook, Charles, "Do GM crops mean less pesticide use?," *Pesticide Outlook*, 2001, 12, 204-207. DOI: 10.1039/b108609j.

Benbrook, Charles, "Apples, kids and core science," *Choices. The Magazine of Food, Farm, and Resources Issues*, 2000, (No. 3), 21-24.

Lynch, Sarah, Sexson, Deana, Benbrook, Charles, Carter, Mike, Wyman, Jeff, Nowak, Pete, Barzen, Jeb, Diercks, Steve, & Wallendal, John, "Working Out the Bugs," *Choices*, 2000, Third Quarter 2000, 28-32.

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- Benbrook, Charles, "The Den Bosch Declaration: Grappling with the challenges of sustainability," *Journal of Soil and Water Conservation*, 1991, 46(5), 349-352.
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<http://www.jswconline.org/content/46/2/89.extract>.
- Benbrook, Charles, "Sustainable agriculture: Policy options and prospects," *American Journal of Alternative Agriculture*, 1989, 4(3-4), 153-159. DOI: 10.1017/S088918930000299X.
<https://www.cambridge.org/core/article/sustainable-agriculture-policy-options-and-prospects/9BDD34D80698781F21BBF5A8793BCC61>.
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- Benbrook, Charles, "Is American environmental policy ready for de minimis risks in water?," *Regulatory Toxicology and Pharmacology*, 1988, 8(3), 300-307.
<https://www.ncbi.nlm.nih.gov/pubmed/3238061>.
- Benbrook, Charles, "The science and art of conservation policy," *Journal of Soil and Water Conservation*, 1986, 41(5), 285-291.
<http://www.jswconline.org/content/41/5/285.extract>.
- Benbrook, Charles, & Moses, Phyllis B., "Engineering Crops to Resist Herbicides," *Technology Review*, 1986, 89(8), 55-79.
- Benbrook, Charles, "Funding Agricultural Economics Research: Discussion," *American Journal of Agricultural Economics*, 1985, 67(5), 1262-1263. DOI: 10.2307/1241413.
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Reports, Papers, and Book Chapters (partial list)

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Benbrook, Charles, "Glyphosate Tolerant Crops in the EU: A Forecast of Impacts on Herbicide Use," 2012, Greenpeace International.

Benbrook, Charles, "Initial Reflections on the Annals of Internal Medicine Paper "Are Organic Foods Safer and Healthier Than Conventional Alternatives? A Systematic Review"," 2012, Washington State University.

Benbrook, Charles, "The Organic Center's "Dietary Risk Index": Tracking Relative Pesticide Risks in Foods and Beverages," 2011, The Organic Center.

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Benbrook, Charles, "Comments re: National Organic Program's proposed rule on Periodic Residue Testing [Document Number AMS–NOP–10–0102; NOP–10–10, 76 Federal Register 23914---23920 dated April 29, 2011; Regulatory Information Number (RIN) 0581–AD11]." Agency, Year, Available at: URL.

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- Benbrook, Charles, "*Breaking the Mold: Impacts of Organic and Conventional Farming Systems on Mycotoxins in Food and Livestock Feed*," 2005, The Organic Center.
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- Benbrook, Charles, "*Rust, resistance, run down soils, and rising costs—Problems facing soybean producers in Argentina*," 2005, AgBioTech InfoNet, Technical Paper Number 8.
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Agriculture and Groundwater Quality: Policy Implications and Choices. January 17, 1989. Paper presented as part of the "Technical Session on Agriculture and Groundwater Quality," 1989 Annual Meeting of the American Association for the Advancement of Science, San Francisco, California.

Practical Realities and Political Options in Overcoming World Hunger. February 28, 1989. Invited testimony before the Subcommittee on Natural Resources, Agriculture Research, and the Environment, House Committee on Science and Technology.

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