

CHARLES M. BENBROOK

**BUSINESS
AND HOME
ADDRESS** 90063 Troy Road
Enterprise, Oregon 97828

PHONE (541) 828-7918 (Business)

FAX (541) 828-7921

E-MAIL -- cbenbrook@wsu.edu; Benbrookconsulting@gmail.com

PERSONAL INFORMATION

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

EDUCATION

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

EMPLOYMENT HISTORY

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

Research scientists 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; Consultant June 1 to present.

Develops and manages a program of research on the environmental and consumer health benefits of organic foods and farming. Responsible for synthesizing new research and science on the impacts of organic and conventional farming systems on food safety, nutritional quality, and taste.

Benbrook Consultant Services (BCS). Sole proprietor of a Troy, Oregon based consulting

business. December 1, 1990 to present.

Services for domestic and international clients in the public and private sectors. Major areas of focus include biotechnology; pesticide use, risks, and regulation; adoption and costs-benefits of Integrated Pest Management; impacts of federal environmental 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. BCS makes heavy use of government, academic and private sector data sets in shedding light on key policy choices, and maintains extensive, interlinked databases.

Clients include national consumer and environmental groups, international organizations, companies, federal and state government agencies, trade associations, and academic research organizations. Benbrook has also served as an expert witness in several pesticide and biotechnology related lawsuits.

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

The Board on Agriculture is one of eight major units of the NRC. The executive director is responsible for overseeing and managing activities of the Board. When hired, the Board had three staff (a secretary and two program officers). Benbrook expanded the scope of activities and raised over \$1 million per year. The staff grew over seven years to exceed 20.

Major NAS reports carried out during this period covered the early methods and applications of agricultural biotechnology; unique risks faced by infants and children from pesticide exposure, modernizing U.S. pesticide regulatory law, pesticide use and resistance, options to improve the nutritional composition of animal products, animal nutrition needs, agricultural education programs at the federal level, soil and water conservation, germplasm conservation and use, the healthfulness of food products and options to improve food safety, agriculture's impact on water and soil quality, and agricultural research and sustainable development needs and challenges.

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. April 1981 - January 13, 1984.

Responsibilities of the staff director include: (i) preparing and analyzing legislation within the jurisdiction of the subcommittee (agricultural research system, pesticide regulation, foreign agricultural issues and programs, and plant and animal protection programs); (ii) conducting subcommittee business meetings; (iii) briefing members and staff on legislation and oversight activities; and (iv) analyzing annual budget proposals.

During this period, Benbrook participated in the drafting and passage of legislation in many areas. Major pesticide reform legislation was debated each year, but never passed. Benbrook and staff working for Congressman Jim Weaver of Oregon drafted the first version of what

became the Organic Food Production Act (passed in the 1990 farm bill). Oversight hearings by the Subcommittee on pesticide risk and regulatory issues led to the recognition, and ultimately the resolution, of the Delaney paradox (focus on the 1987 NAS report).

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

Responsibilities included: (i) representing CEQ on various Executive Branch committees; (ii) analyzing natural resource data and policy options; (iii) preparing the agricultural section of the Natural Resources chapter in CEQ's 1980 annual report; and (iv) principal author of the Final Report to the President of the National Agricultural Lands Study.

AWARDS and HONORS

Appointed as member, USDA's AC 21 agricultural biotechnology advisory committee, 2010.

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.

RESEARCH and ANALYTICAL ACTIVITIES

1979-1983: Carried out the basic analytical work on the extent and distribution of soil erosion that was used in developing and building the case for the conservation provisions in the 1985 farm bill. This work, carried out with the help of Dr. William Larson, Univ. of Minnesota, was the first independent analysis of erosion challenges conducted outside USDA utilizing the Natural Resources Inventory dataset. The results were reported in several publications (see list below), as well as in CEQ publications and the 1983 American Farmland Trust report on soil conservation. These analytical findings were cited by all major participants in the debate leading to passage of Title 12 in the 1985 Food Security Act.

1981- present: Carried out Congressional oversight investigation of the pesticide regulatory activities of the Environmental Protection Agency, focusing on Reagan-administration policy changes. Wrote the synthesis volume and compiled the other three volumes of the subcommittee report: "EPA Pesticide Regulatory Study." This report contained a comprehensive review of the legal, administrative, and scientific dilemmas confronting pesticide regulatory officials. The report's findings and recommendations formed the basis of several major legislative proposals to amend the Federal Insecticide, Fungicide, and Rodenticide Act in the 99th-101st Congresses, and

led to the 1984-1987 NAS/NRC project that produced the report *Regulating Pesticides in Food: The Delaney Paradox* (1987). This NAS/NRC report identified the need for further assessment of the unique regulatory challenges entailed in protecting the health of infants and children, and the NAS/NRC project that produced the seminal 1993 report *Pesticides in the Diets of Infants and Children*.

The recommendations in the 1993 NAS/NRC report were adopted fully in the 1996 “Food Quality Protection Act.” From 1997-2006, Benbrook carried out many studies of FQPA implementation for Consumers Union and other clients. Multiple books, reports, and articles were developed reporting this work.

Benbrook has remained actively involved in the developing methods to assess pesticide residue and risk levels in food. In 2005-2006, the EPA’s Office of Inspector General hired Benbrook to apply his risk model to an evaluation of the impacts of the Food Quality Protection Act (FQPA).

1984-present: Helped design, develop and apply the dataset and analytical methodology underlying the work of the NAS/NRC committee on pesticide residues in the food supply. In conjunction with Dr. John Wargo of Yale University and Mr. Richard Wiles of the Board on Agriculture staff, developed the method used by the NAS/NRC committee to conduct a cumulative risk assessment of exposure and risks to oncogenic pesticides, the first such analysis ever conducted. The method utilized USDA food consumption data, and EPA tolerance and toxicological data, and a Monte Carlo simulation model. The basic method set forth in this report formed the foundation for contemporary EPA cumulative risk assessments of the organophosphate insecticides.

1988-1989: Compiled data and conducted analysis of private sector research investments in the food and agricultural industries. The results of this analysis are reported in 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-present: Developed the first system in the U.S. designed to quantify the level of adoption of Integrated Pest Management along the “IPM continuum.” The original Benbrook Consulting Services IPM measurement system was set forth in Chapter 7 in the Consumers Union book *Pest Management at the Crossroads* (1996). The first empirical application focused on weed management in corn and soybeans and was done as part of a World Wildlife Fund project. The results were reported in a presentation made to the Weed Science Society of America circa 1998.

This early model of IPM adoption has been refined and augmented through several iterations and applications in projects with the Wisconsin Potato and Vegetable Growers Association and University of Wisconsin-Madison, Gerber Products Company, Glades Crop Care of Jupiter Florida, and the Lodi-Woodbridge Wine Grape Commission. The pesticide risk indicator component of the IPM measurement system is now the “Pesticide Environmental Assessment System,” or PEAS. In 2007, a large team led by Dr. Tom Green of the IPM Institute, applied for and received an \$800,000.00 NRCS Conservation Innovation Technology grant to refine the

water quality components in PEAS and make the model accessible via the Internet. Benbrook is a PI on this grant. Benbrook wrote an earlier, successful RAMP grant proposal (Risk Avoidance and Management Program, an USDA competitive grant program focusing on large, multistate IPM projects) that provided support for enhancement of modules in PEAS.

1999-2004: Developed and applied a method to estimate the usage of subtherapeutic doses of antimicrobials in livestock for growth promotion and disease prevention, as part of projects focusing on antibiotic resistance management. Developed the model and results reported in the Union of Concerned Scientists' report *Hoggin It! Estimates of Antimicrobial Abuse in Livestock* (2001). Subsequent work has focused on the costs and prevention of antibiotic resistance.

2004-present: Through work with The Organic Center, Benbrook is developing a food quality index modeling system encompassing positive (e.g., nutrient density, nutrient composition, taste) and negative attributes of food (e.g., fat, salt, sugar levels; pesticide residues/risk; bacteria and mycotoxins). An Access database and modeling system has been developed to assess differences in the nutrient density of foods produced using conventional and organic production systems.

REPORTS, ARTICLES, AND PRESENTATIONS

Benbrook has published peer reviewed articles in multiple disciplines including agricultural biotechnology, pesticide use and residues in food, soil and water conservation, pesticide risk assessment methods, Integrated Pest Management, germplasm conservation, scientific basis for evaluating agricultural technologies, antibiotic use and resistance, food safety, international agricultural development, sustainable agriculture, and agricultural policy.

Reports, Papers, and Book Chapters (partial list)

Benbrook, C. *Transforming Jane Doe's Diet*, Critical Issue Report, The Organic Center, Boulder, CO., 2011, access at –
http://www.organic-center.org/science.nutri.php?action=view&report_id=190

Benbrook, C. *The Organic Center's "Dietary Risk Index" – Tracking Relative Pesticide Risks in Foods and Beverages*, The Organic Center, Boulder, CO., 2011, access at www.organic-center.org/DRI

Benbrook, C., and D.R. Davis. *Identifying Smart Food Choices on the Path to Healthier Diets: Documentation and Applications of TOC-NQI, Version 1.1*. The Organic Center, Boulder, CO., 2011, access at: www.organic-center.org/TOC-NQI

Benbrook, C. et al. *A Dairy Farm's Footprint: Evaluating the Impacts of Organic and Conventional Dairy Production Systems*, Critical Issue Report, The Organic Center, Boulder, Co., 2010, access at –
http://www.organic-center.org/science.environment.php?action=view&report_id=184

Benbrook, C. *What Does Sustainable Agriculture Have to Offer? Conclusions and Recommendations in Two NAS Reports*, Critical Issue Report, The Organic Center, Boulder, Co., 2010, access at – http://www.organic-center.org/science.environment.php?action=view&report_id=180

McCullum-Gomez, C., Benbrook, C., and R. Theuer. *That First Step: Organic Food and a Healthier Future*, Critical Issue Report, The Organic Center, Boulder, CO., 2009, access at http://www.organic-center.org/science.healthy.php?action=view&report_id=149

C., Benbrook, C., X. Zhao, J. Yanez et al. *New Evidence Confirms the Nutritional Superiority of Plant-Based Organic Foods*, State of Science review, The Organic Center, Boulder, CO., 2008, access at -- http://www.organic-center.org/science.nutri.php?action=view&report_id=145

Benbrook, C. *Simplifying the Pesticide Risk Equation: The Organic Option*, Critical Issue Report, The Organic Center, Boulder, Co., 2008, access at http://www.organic-center.org/science.pest.php?action=view&report_id=125

Benbrook, C. “Principles Governing the Long-Run Risks, Benefits, and Costs of Agricultural Biotechnology,” Chapter 11, *Biodiversity and the Law: Intellectual Property, Biotechnology, and Traditional Knowledge*. Edited by Charles McManis, Earthscan, 2007.

Benbrook, C. *Unfinished Business: Preventing E. coli O157 Outbreaks in Leafy Greens*, Critical Issue Report, The Organic Center, 2007. 21 pages.

Benbrook, C., Greene, Al., Lu, C., and Landrigan, P. *Successes and Lost Opportunities to Reduce Children’s Exposure to Pesticides Since the Mid-1990s*, Critical Issue Report, The Organic Center, 2006. 41 pages.

Benbrook, C. *E. coli – Frequently Asked Questions*, Critical Issue Report, The Organic Center, 2006. 30 pages.

Benbrook, C. *Breaking the Mold – Impacts of Organic and Conventional Farming Systems on Mycotoxins in Food and Livestock Feed*, State of Science Review, The Organic Center, 2005. 70 pages.

Benbrook, C. *Elevating Antioxidant Levels in Food through Organic Farming and Food Processing*, State of Science Review, The Organic Center, 2005. 78 pages.

Benbrook, C. “Tracking the Impacts of the FQPA on Pesticide Dietary Risks -- A Preliminary Assessment,” report commissioned by the EPA Office of Inspector General, 2005.

Benbrook, C. *Minimizing Pesticide Dietary Exposure Through the Consumption of Organic Food*, State of Science Review, The Organic Center, 2004. 63 pages.

Benbrook, C. “Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years,” Critical Issue Report, The Organic Center, 2009.

Benbrook, C. “Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Eight Years”. 2003.

Benbrook, C. “Genetically Engineered Crops and Pesticide Use in the United States: The First Nine Years,” Ag BioTech InfoNet Technical Paper #7, 2005.

Benbrook, C. et. al. “Use of ‘resistance risk profiles’ to guide resistance management planning”, *Pesticide Outlook*, 14:3, June 2003.

Mellon, M., Benbrook, C., and K.L. Benbrook. *Hogging It!: Estimates of Antimicrobial Abuse in Livestock*, Published by the Union of Concerned Scientists, January 2001.

Benbrook, C. et al. “Update: Pesticides in Children’s Foods, An analysis of 1998 USDA PDP Data on Pesticide Residues,” Consumers Union of the U.S., Inc. May 2000.

Benbrook, C., Groth, E., Hanson, M., and S. Marquardt. *Pest Management at the Crossroads*, Consumers Union, 1996. 272 pages.

Benbrook, C. et al. “Do You Know What You Are Eating?” Consumers Union of U.S., Inc. Public Service Projects Department, Technical Division, February 1999.

Benbrook, C., and Marquardt, D. *Challenge and Change: A Progressive Approach to Pesticide Regulation in California*, Cal-EPA, Department of Pesticide Regulation, 1993. 153 pages.

Benbrook, C. “The Road from Rio: An International Policy and Action Framework for Sustainable Agriculture and Rural Development,” (Client: FAO/UN), 1994.

Benbrook, C. “U.S. Foreign Aid: What Counts for Sustainable Development?,” (Client: Coalition of NGO/PVO groups led by Bread for the World), 1995.

Benbrook, C. “Unraveling Delaney's Paradox: Challenges for the 102nd Congress,” (Client: Institute for Science in Society).

Benbrook, C. “Costs and Benefits of Water Quality Best Management Practices,” (Client: Environmental Protection Agency).

Benbrook, C. “Sustainable Agriculture in the 21st Century: Will the Grass Be Greener?,” (Client: Humane Society of the United States), 1992.

Benbrook, C. “Natural Resources Assessment and Policy,” Chapter 12 in *Soil Management for Sustainability*, Edited by R. Lal, and F.J. Pierce. Proceedings of a Special Symposium held in

Edmonton, Alberta, August, 1989 honoring the work and accomplishments of Dr. William E. Larson.

Benbrook, C. 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.

Benbrook, C., and Brown, W. "Public Policies and Institutions to Enhance Crop Productivity," *Crop Productivity Research Imperatives Revisited*, proceedings of the Crop Productivity Revisited Conference, December 11-13, 1985, Airlie, Virginia, pp. 239-257.

Articles

Benbrook, C. "The Impacts of Yield on Nutritional Quality: Lessons from Organic Farming," *HortScience*, (2007).

McCullum, C., C.M. Benbrook, L. Knowles, S. Roberts, T. Schryver, "Application of Modern Biotechnology to Food and Agriculture: Food Systems Perspective", *J. Nutr. Educ Behav.*, (2003); 35:319.

Baker, B. P., Benbrook, C. M., Groth, E., and K.L. Benbrook.. "Pesticide residues in conventional, integrated pest management (IPM)-grown and organic foods: insights from three US data sets." *Food Addit. Contam* 19.5 (2002): 427-46.

Benbrook, C. M. et al. "Developing a pesticide risk assessment tool to monitor progress in reducing reliance on high-risk pesticides." *American Journal of Potato Research*, 79 (2002): 183-99.

Benbrook, C. M. "Organochlorine residues pose surprisingly high dietary risks." *J Epidemiol Community Health* 56.11 (2002): 822-23.

Benbrook, C. "Do GM Crops Mean Less Pesticide Use?," *Pesticide Outlook*, Royal Society of Chemistry, October 2001.

Benbrook, C. M. "Performance criteria for IPM: measuring IPM results," Henk, M. Kogan M. IPM in Oregon: Achievements and Future Directions, Special Report 1020 , 19-27. 2000. Corvallis: Integrated Plant Protection Center, Oregon State University Extension Service.

Benbrook, C. "Apples, Kids and Core Science," *Choices*, Third Quarter 2000, Am. Ag. Econ. Assoc.

Lynch, S., D. Sexson, C.M. Benbrook, M. Carter, J. Wyman, P. Nowak, J. Barzen, S. Diercks, J. Wallendal, "Working out the Bugs", *Choices*, Third Quarter 2000, Am. Ag. Econ. Assoc.

Benbrook, C. “What We Know, Don't Know, and Need to Know About Pesticide Residues in Food,” January 23, 1990. Chapter 15 in *Pesticide Residues and Food Safety: A Harvest of Viewpoints*, Edited by B.G. Tweedy, et. al., Amer. Chemical Society Symposium Series # 446, 1991.

Benbrook, C. “Why A Leopold Center for Sustainable Agriculture?,” February 6, 1990. Jan-Feb. 1991 issue of the *Journal of Soil and Water Conservation*.

Benbrook, C., and Moses, P. “Engineering Crops to Resist Herbicides,” *Technology Review*, MIT Press, November-December 1986, pp. 55-61, 79.

Benbrook, C. “Is American Environmental Policy Ready for de Minimis Risks in Water?,” *Regulatory Toxicology and Pharmacology* 8, pp. 300-307 (1988).

Benbrook, C. “First Principles: The Definition of Highly Erodible Land and Tolerable Soil Loss,” *Journal of Soil and Water Conservation*, January-February 1988, pp. 35-38.

Benbrook, C. “The Science and Art of Conservation Policy,” *Journal of Soil and Water Conservation*, September-October 1986, pp. 285-291.

Presentations, Comments, Congressional Testimony, and Opinion Pieces

Benbrook delivers between 10 and 20 presentations per year; a partial listing follows.

Benbrook, C. “Private Sector Initiatives to Reduce Children’s Pesticide Exposures,” AAAS annual meeting symposium on reducing children’s pesticide risks, February 19, 2006, St. Louis, Missouri.

Landrigan, P., and Benbrook, C. “Impacts of the Food Quality Protection Act on Children’s Exposures to Pesticides,” AAAS annual meeting symposium on reducing children’s pesticide risks, February 19, 2006, St. Louis, Missouri.

Benbrook, C. “Sowing the Seeds of Destruction,” Op-Ed in the New York Times, July 11, 2003. Accessible at http://www.biotech-info.net/sowing_seeds_NYT.html

Benbrook, C. “Stakeholder Roles in Resistance management – Time to Get with the Program” CAST Resistance Management Symposium, April, 2003.

Benbrook, C.M., “Why pesticide risks matter and pose tough challenges for ecolabel programs”, In Proceedings of a Conference on Ecolabels and the Greening of the Food Market, Tufts University, Boston MA, November 7-9, 2003.

Benbrook, C., and E. Groth. “Who Controls and Who Benefits from Plant Genomics?,” AAAS Genomics Seminar Paper, February 19, 2000.

Nigh, R., Benbrook, C., Brush, S., Garcia-Barrios, L., Ortega-Paczka, R., Perales, H.R. "Transgenic crops: a cautionary tale," *Science*, Vol. 287 (5460), 2000. Page 1927.

Benbrook, C. M." Performance criteria for IPM: measuring IPM results," Henk, M. Kogan M. IPM in Oregon: Achievements and Future Directions, Special Report 1020 , 19-27. 2000. Corvallis: Integrated Plant Protection Center, Oregon State University Extension Service.

1998-2002 comments to the EPA and reports on the implementation of the Food Quality Protection Act are accessible through the Consumers Union FQPA website at <http://www.ecologic-ipm.net>.

Benbrook, C. and J. Cook.. "Striving Toward Sustainability: A Framework to Guide On-Farm Innovation, Research, and Policy Analysis," March 2, 1990. Paper presented at the 1990 Pacific Northwest Symposium on Sustainable Agriculture, Vancouver, Washington.

Benbrook, C. "Conflict or Cooperation: The Path to a 1990 Farm Bill," March 22, 1990. Speech presented before the "Who's Writing the Farm Bill?" Conference, sponsored by Governor George Mickelson and the South Dakota Department of Agriculture, Sioux Falls.

Benbrook, C., and Moses, P. "Herbicide Resistance: Environmental and Economic Issues," Proceedings, BioExpo 1986.

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.

Sustainable Agriculture: Policy Options and Prospects. February 28, 1989. Speech before the Institute for Alternative Agriculture Symposium on Sustainable Agriculture, Washington, DC. Published in the *American Journal of Alternative Agriculture* 4:3-4, pp. 153-159.

Coping With Delaney's Paradox. May 15, 1989. Invited testimony before the Subcommittee on Toxic Substances, Environmental Oversight, Research and Development of the Senate Committee on Environment and Public Works.

Will S. 7222 Unravel Delaney's Paradox? June 6, 1989. Invited testimony before the Senate Labor and Human Resources Committee's Food Safety Hearing.

Priority Setting Mechanisms Utilized by the U.S. Department of Agriculture. June 20, 1989.

Testimony before the Senate Agriculture Committee's Agricultural Research and General Legislation Subcommittee.

The United States' Progress Toward Sustainable Resource Development. July 31, 1989. Paper presented at the Forty-fourth Annual Meeting of the Soil and Water Conservation Society, Edmonton, Alberta, Canada.

Balancing Agricultural Production and Resource Conservation Goals Through Commodity Program Reform: Recommendations from the NAS Report Alternative Agriculture. September 21, 1989. Invited testimony before the Senate Committee on Agriculture, Nutrition, and Forestry's Subcommittee on Agriculture Production and Stabilization.

Alternatives to Pesticides: Findings and Recommendations from the NAS Report Alternative Agriculture. September 22, 1989. Invited testimony by Dr. Charles M. Benbrook and Dr. Robert M. Goodman before the Senate Committee on Environment and Public Works' Subcommittee on Toxic Substances, environmental Oversight, Research and Development Hearing on Pesticides.

Agriculture's Contribution to Water Quality Protection: Lessons from the NRC Report Alternative Agriculture. October 3, 1989. Invited testimony before a joint hearing of the House Committee on Agriculture's Subcommittee on Department Operations, Research, and Foreign Agriculture, and the House Committee on Science and Technology's Subcommittee on Natural Resources, Agricultural Research, and the Environment.

Unraveling Delaney's Paradox: Unfinished Business. October 19, 1989. Invited testimony before the House Committee on Agriculture's Subcommittee on Department Operations, Research, and Foreign Agriculture.

Opportunities to Protect Water Quality: Lessons from the NRC Report Alternative Agriculture. October 24, 1989. Invited testimony before a hearing of the Senate Committee on Agriculture, Nutrition, and Forestry's Subcommittee on Conservation and Forestry.

Quality in the American Food Industry: Lessons from the NRC Alternative Agriculture Report. November 3, 1989. Paper presented at the Seventh International Conference on Gastronomy; "Tradition and Innovation in American Food and Wine--A View From the Midwest," Chicago, Illinois.

Beware the Future: Pesticides, Public Policy, and Pest Management. Presented before the 14th Illinois Crop Protection Workshop sponsored by the Illinois Cooperative Extension Service, March 9-11, 1988.

Pesticide Food Safety Act of 1988. September 7, 1988. Invited testimony before the Subcommittee on Department Operations, Research, and Foreign Agriculture, Committee on Agriculture, U.S. House of Representatives.

Florida's Food Safety Challenges. September 27, 1988. Speech presented at the 45th Annual Convention of the Florida Fruit and Vegetable Association in Naples, Florida.

Pesticide Regulatory Policy: Creating a Positive Climate for Innovation. Presented before the Conference on Technology and Agricultural Policy on December 12, 1986. Published in *Technology and Agricultural Policy: Proceedings of a Symposium*, 1990, pp. 122-140.

Federal-State Cooperation in the Regulation of Pesticides, chapter in the *Primer Agricultural Chemicals and the Midwestern States*. Proceedings of a conference held March 27-28, 1987.

Major Board on Agriculture NAS/NRC Reports

Soil Conservation: An Assessment of the National Resources Inventory, Volumes 1 and II (1986)

Pesticide and Groundwater Quality: Issues and Problems in Four States (1986)

Pesticide Resistance: Strategies and Tactics for Management (1986)

Agricultural Biotechnology: Strategies for National Competitiveness (1987)

Educating the Next Generation of Food and Agricultural Professionals (1987)

Regulating Pesticides in Food: The Delaney Paradox (1987)

Designing Foods: Animal Product Options in the Marketplace (1988)

Understanding Agriculture: Education in the Secondary Schools (1988)

Alternative Farming (1989)

Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System (1990)

Partial List of Hearings Conducted by the Subcommittee on Department Operations, Research, and Foreign Agriculture

Agricultural Research System

Overnight Hearings on Agricultural Research -- June 22, 23, 28, 29, 1982.

Review of the Report "Extension in the Eighties," June 30, 1983 (Ser. No. 98-28).

Extension Service Oversight, February 17 and March 9 and 10, 1982 (Ser. No. 97-EEE).

National Plant Germplasm System, June 24, 1981 (Ser. No. 97-W).

1981 Farm Bill, agricultural research and extension titles, March 19 and 20, June 6 and 28, 1981 (Ser. No. 97-G, Part 8).

H.R. 1309 on the 1890 land grant colleges, June 4, 1981.
Resident instruction hearings, February, 1984.

Information Management

"Information Technology for Agricultural America." Workshop and Committee Print, December 1982.

Application of Computer Based Information Systems and Services in Agriculture, May 19 and 20, 1982.

Natural Resources Data Bases, June 2, 1981 (Ser. No. 97-K).

Substantial portions of "Sustainable Agricultural Systems," April 22 and 27, 1982 (Ser. No. 97-PPP).

Natural Resource Conservation

Sustainable Agricultural Systems, April 16, 22, and 27, 1982 (Ser. No. 97-PPP).

Groundwater Quality and Quantity Issues, July 23, 1981 (Ser. No. 97-7).

Salinity Control in the Colorado River Basin, June 10, 1981 (Ser. No. 97-L).

Effects of Air Pollution on Agricultural Productivity, July 9, 1981 (Ser. No. 97-TT).

Pesticide Regulation and Pest Control Issues

EPA Pesticide Regulatory Program Study, December 17, 1982 (Ser. No. 97-NNNN).

Regulation of Pesticides, February 22 and 23, April 6, June 9, July 6 and 27, 1982 (Four volumes, Ser. No. 98-).

Federal Insecticide, Fungicide, and Rodenticide Hearings in the 97th Congress, June 16 and 18, July 16 and 22, September 4, 1981, February 4, 1982 (Ser. No. 97-R, Parts I, II, III).

APHIS Oversight, July 28, 1983 (Ser. No. 98-).

Miscellaneous APHIS programs, September 21, 1982 (Ser. No. 97-FFFF). Compensation for Quarantine Plant Pest Loss; Protection Against Plant Pests, October 1, 1981.

Nutrition Research

Federal Commitment to Human Nutrition Research. June 23, 1982 (Ser. No. 97-WWW).

Reorganization of USDA's Food and Nutrition Service, September 17, 1981. Committee on Science and Technology Implementation Plan for a National Nutrition Status Monitoring System, June 24, 1981 (Ser. No. 97-N).