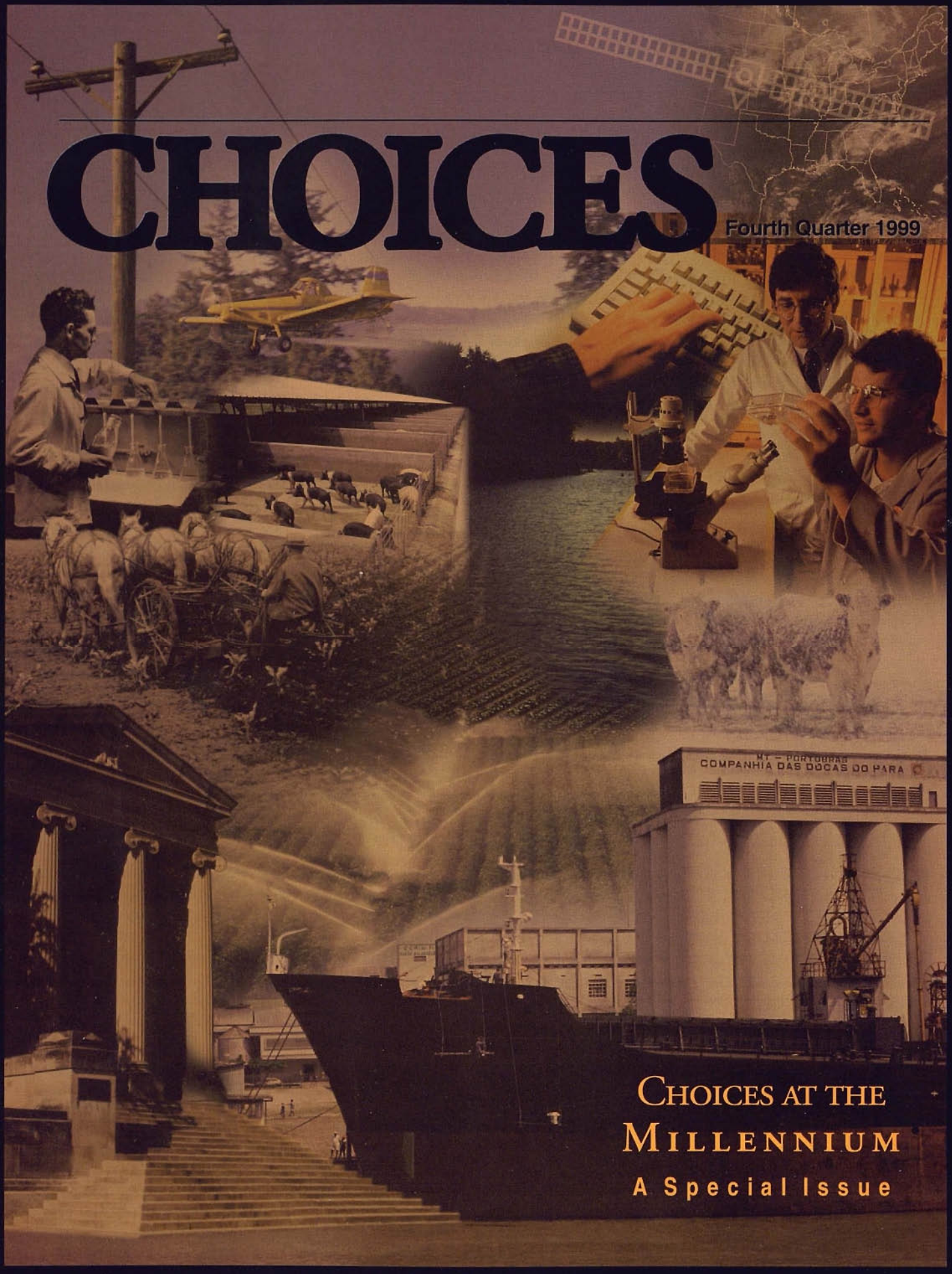
THE MAGAZINE OF FOOD, FARM, AND RESOURCE ISSUES



CHOICES

Fourth Quarter 1999

CHOICES AT THE MILLENNIUM

A Special Issue

Findings from Nine Decades of our Journal

A decade-by-decade sampling of findings that agricultural and resource economists have published in the *Journal of Farm Economics* (*JFE*), and its successor, the present *American Journal of Agricultural Economics* (*AJAE*). Thanks to Gerald F. Vaughn, *Choices*'s unofficial historian, for selecting these findings.

- **The Journal's Objective.** Influences upon price, value, cost, profit, supply and demand, legislation, cooperation, utilization of land and capital, and economic tendencies should be studied, simplified, discussed, and understood, and with such material the JOURNAL will be concerned—said the Executive Committee of the American Farm Economic Association in 1919.

- **A Fair Share of the National Income.** Low farm incomes can be improved by national policies that reduce protective tariffs for industry, encourage migration from the farm to off-farm employment, and provide a means for taking land out of agricultural production—said Taylor in 1929.

- **Better Land Utilization.** New York policy makers of Governor Franklin D. Roosevelt's administration recommended state purchase and reforestation of poor farmland, and accompanying rural policies to finance roads, schools, and research for areas more suited to farming—said Warren in 1930. In 1936, Gray describes President Roosevelt's New Deal national land program, a program rooted in the New York land acquisition policies.

- **Training for Public Service.** Broadly trained agricultural economists provide more valuable public service than do those narrowly trained—said Black in 1940. In 1948, Brinser and Wheeler apply this broad-based training to improve farm credit policy.

- **Farm Programs.** The Agricultural Act of 1954 failed to correct the shortcomings of previous farm programs, including the surplus problem, the problems of acreage allotments and marketing quotas, the trade problems of subsidies and quotas, and the discrimination problems whereby some farm sectors received subsidies and others did not—said Galbraith in 1955. Galbraith's assessment can be compared to Brandt's views on international trade in 1953 and Schultz's reflections and diagnosis of the farm problem in 1956.

- **Improving the Agricultural Outlook Program.** The already helpful agricultural outlook program of the USDA can be improved by more and better state studies; information on a broader range of farm family incomes; attaching probabilities to forecasts; tailoring information to the needs of a changing structure in agriculture; more complete descriptive assessments of foreign markets; assessments of the effects of alternative government policies on the agricultural outlook; projections of profitability by ownership, management, and credit type; and greater use of electronic data processing—said Timm in 1966.

- **Extractive Inputs and Agriculture.** Increasing prices of extracted inputs like petroleum, phosphate rock, and metals will increasingly affect agriculture and, in particular, slow the industrialization of the crop, livestock, and marketing sectors—said Breimyer in 1978.

- **Market Environmentalism.** Innovative market-based remedies to land and water conflicts can assist but cannot completely substitute for needed institutional reforms—said Bromley in 1982.

- **Income Taxes and Storable Commodities.** Progressive income taxes reduce storage and increase price volatility of agricultural commodities—said McNew and Gardner in 1999.

Citations are found on page 27.

by Harry W. Ayer ■ Editorial

Celebrating Agriculture and Resources at the Millennium!

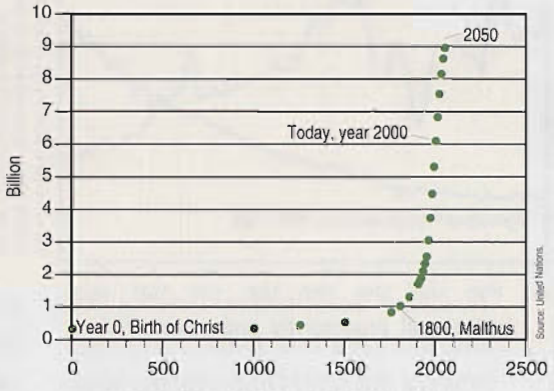
How might we mark the new millennium? What story might help us recall where the world has been and where it might be headed as we celebrate agriculture and resources?

Just over 200 years ago, in 1798, Reverend Thomas Malthus published his *Essay on the Principle of Population*, outlining a dismal forecast for the future of humankind. The rule of Nature dictated that the reproductive urge would push population beyond Nature's ability to provide subsistence. Population would expand in geometric fashion, but food, only arithmetically. Even today, data and estimates make us pause with wonder at the remarkable record of past world population growth and the projections of what lies ahead.

At the birth of Christ, the population of the world stood at 300 million. A thousand years later—and given the attrition of plague, war, and natural disasters—population had changed little. But, as world government and natural science progressed, nearly a billion people inhabited the earth by the time of Malthus, and population was beginning its explosive trajectory. At the beginning of this century, progress in medicine had lowered death rates significantly, and by our millennium year 2000 population totals just over six billion. Fifty years from now, as projected by the United Nations, the world's population will reach nearly nine billion people! Although Malthus may have misgauged our ability to provide sustenance, we cannot doubt that these population increases did and will profoundly affect agriculture and the environment.

The historical record of people's incomes, as measured by real per capita Gross National Product, tells another important story for agriculture and resources.

Roughly speaking, U.S. consumers can now purchase and enjoy over five times more goods and services than did their grandparents and great grandparents at the turn of the century. Not only have we been able to meet the basic needs that so concerned Malthus, we have gone far beyond those and now enjoy more exotic foods, shelters, and environmental amenities. If we project just fifty years into the future based on last century's experience, we get some notion of the magnitude of potential benefits that lie ahead. Consider the growth in real GNP per capita from 1900 to 1997, a period including the Great Depression, but still yielding an average growth rate of 1.8 percent. If this rate continues, real GNP per capita would equal $69,000 by 2050, over two times the current level. At a growth rate of 2.8 percent (the rate of growth between 1933 and 1997), real GNP per capita would equal $104,000 in 2050. Need we wonder that the demand for food, fiber, resources, and environmental amenities will change markedly as we move through the next millennium?



World Population, Year 0 to 2050

The income figures for the United States present a remarkable record, but the rise in production and incomes of other countries over the last thirty years tells an equally impressive story. In fact, the rate of growth in real Gross Domestic Product of other industrialized countries averaged slightly greater than that of the United States. For developing countries, the rate of income growth was far greater—4.7 percent average rate of growth in real GDP for developing countries, compared to 2.92 percent for the United States. Pockets of poverty, however, continue to plague some people in both developing and developed countries. While the world has produced enough food, poverty has denied some people access to it.

As incomes rise, not only can consumers purchase more, but they shift their demands among food and service types, giving rise to a change in the variety and quality of items demanded from agriculture.

As we learn from authors in this special issue of *Choices*, populations of less developed countries will, for the foreseeable future, grow more than those of industrialized countries, will be increasingly urbanized (often notably more urbanized), and will experience higher per capita incomes. These powerful forces will dictate large shifts in world food consumption—where it will occur, and the types of food demanded. The populations of less developed countries will account for most new food demand and will direct their consumption more toward protein foods and away from cereals. At the same time, the populations of developed countries, especially the baby boomers and emerging ethnic groups, will demand food quality changes.

Increases in incomes in developed regions, along with rising populations, urbanization, and incomes in the developing world, will increase the pressure on resources and the environment.

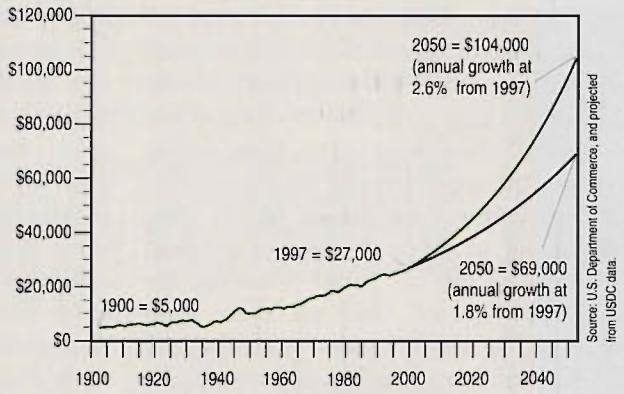
The developing areas will demand more potable and irrigation water, more land and water for disposal of waste from more concentrated livestock production, and more land for agricultural activities in places formerly used in less intensive ways. In developed countries, higher incomes will continue to translate into demand for resource and environmental preservation and restoration, even at the expense of more business-oriented activities.

Agriculture has contributed mightily to feeding, clothing and sheltering the world's rapidly growing, ever more prosperous population. Malthus certainly did not expect such a response from agriculture!

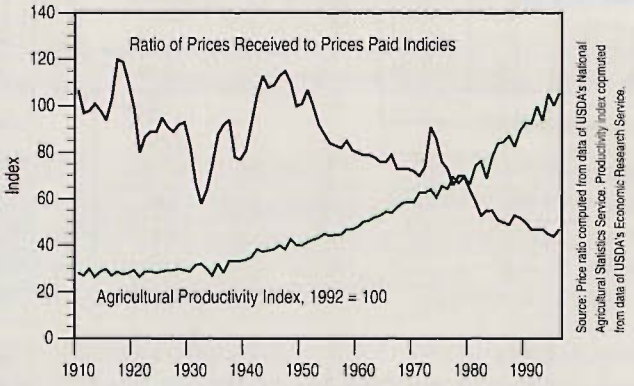
Agriculture's record seems all the more remarkable in light of the general deterioration in prices it has experienced and still faces. The ratio of agricultural prices received to prices paid for inputs has generally declined since the beginning of the century.

Some wild gyrations, however, have punctuated the long-term trend. Commodity prices rose sharply during both world wars, plummeted during the Great Depression, and shot up during the early 1970s when world demand increased precipitously. U.S. farmers planted "fence row to fence row." For the century, however, and since the high prices of World War II, the relative prices farmers receive for their commodities have eroded significantly. Worldwide, the same general trends have prevailed. While this decline in real agricultural prices may appear detrimental to farmers, consumers have benefited enormously. And thinking more globally, the ability to produce agricultural products at declining prices has kept U.S. agriculture and that of some other countries competitive in world markets.

Increases in agricultural productivity—perhaps the single most salient characteristic of agriculture in the United States and developed and developing countries nearly everywhere—has, of course, countered (and contributed to) the deterioration in prices farmers receive. In fact, the rate of productivity growth has far outstripped the rate of real price declines. Moreover, while the U.S. productivity record is impressive, the USDA estimates that the rate of agricultural productivity growth in Europe's largest agricultural countries outpaced U.S. productivity, at least from the mid 1960s to mid 1980s.



Real per capita GNP, U.S. 1900–2050 (constant 1992 dollars)



Agricultural productivity and prices, U.S.

Public investments in agricultural research, development, and infrastructure have provided the single most important source of U.S. productivity increases—75 percent of productivity increases between 1949 and 1991, according to USDA estimates. New knowledge, of course, underlies productivity increases, and, as Millennium authors inside point out, we must be concerned about the adequacy of future investments in knowledge. Public investments in the knowledge embedded in new technologies and institutions that nurture and regulate agriculture seem especially critical for goods and services that the private sector often fails, for good economic reasons, to adequately provide—items such as gene banks, long-term basic research, environmental quality, and food security.

While, historically, public investments yielded great agricultural benefits, recent changes in technology and institutions have increased the importance of private sector research and development. Nutraceuticals and genetically modified organisms or GMOs (each discussed inside) provide two examples of technological changes being spearheaded by the private sector. Nutraceuticals are foods that prevent and cure disease, in addition to offering the more traditional nutrient and pleasure benefits of food. They now represent the fastest growing segment of the food and pharmaceutical industries. Concurrently, GMOs have created widespread trade and food safety disputes. Both new trends—the increase in nutraceuticals and GMOs—will challenge the institutions that govern food and drug safety, the types of products farmers produce, and the way they go about producing and marketing them.

We do, indeed, have reasons to celebrate the record of agriculture and resources at the millennium! This record gives us optimism for the future. But we know, too, that challenges remain. In the age of information, surely knowledge will be an important key to meeting those challenges. At *Choices*, we look forward to helping communicate new knowledge for food, farm, and resource issues in the new millennium!

Harry Ayers

This Special Millennium Issue

This special Fourth Quarter Millennium issue of *Choices* began over a year ago with a call for abstracts related to a millennium theme. Authors submitted fifty-four abstracts. The *Choices* Advisory Board then selected twenty-five of these to be developed into full papers for further consideration. Ultimately, the Board selected thirteen pieces for publication—articles that give both a revealing look at our agricultural and resource past, and an enticing projection of some parts of our future. We allotted more pages to this special edition, and gave more attention to its appearance. We hope you enjoy this Millennium issue!

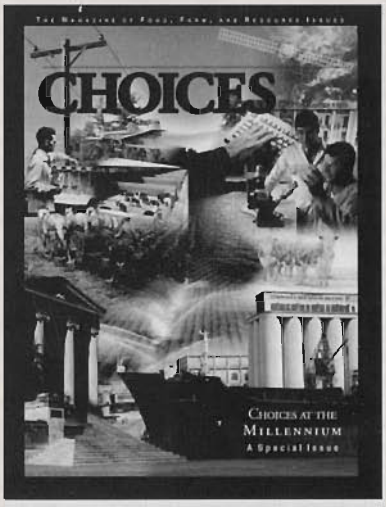
Choices Thanks Millennium Issue Sponsors

Choices gratefully recognizes the following sponsors for their support of this special millennium issue:

- **Farm Foundation**
- **The Freeman Center for International Economic Policy, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota**

On Our Cover

For our special millennium issue cover collage, we explore a few of the more memorable developments in agriculture over the past one hundred years. These include the application of technology to food production and distribution, contention over use of limited resources for recreation and agriculture, the move toward industrialization in agriculture and attendant waste management controversy, the politics surrounding public and private institutional research, and free market and international trade concerns. Given the current rapid change in agriculture, what topics might we illustrate on the cover of *Choices* 2100? Will the challenges be the same? What new tools will economists bring to the problems of the twenty-first century? Authors in this special issue offer some interesting insights into past and future food, farm, and resource issues.



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Keith Wiebe is an economist with the Resource Economics Division of USDA's Economic Research Service. His program of work at ERS includes research on property rights and conservation of environmentally sensitive lands in the United States, as well as on land tenure, land degradarion, and food security in developing countries.

Pierre Crosson is a senior fellow and resident consultant in Resources for the Future's (RFF) Energy and Natural Resources division. For the last twenty years his research has focused on issues relating to sustainable agricultural production systems. Much of this has dealt with rhe United States, but for the last ten years he has become increasingly concerned with the same range of issues in the developing countries.

James Garrett is a research fellow at the International Food Policy Research Institute (IFPRI). He, along with co-author Marie Ruel, leads a multicountry research program on urban food security and nutrition, including case studies in Latin America, Afria, and Asia. The program focuses on understanding trends and determinants of urban poverty, food insecurity, and malnutrition in developing countries, and on determining appropriate program and policy responses.

Marie Ruel is a research fellow at IFPRI. Her research program, with James Garrett, is evaluating the Community Day Care Centers Program of the First Lady of Guatemala; assisting the Government of Mozambique with analysis of a revised poverty-reducrion strategy; and supporting CARE International's programming to reduce urban food insecurity and malnutrition in Bangladesh.

Jorge Fernandez-Cornejo is an economist in the Resource Economics Division of the Economic Research Service, USDA. He joined ERS in 1990, working in quantitative economic analysis and modeling. His main research interests include the adoption of agricultural innovations and the economic and environmental impact of technological change.

Margriet Caswell is chief of the Production Management and Technology Branch at the Economic Research Service. Caswell served on the USDA Biotechnology Council for several years and is a member of rhe U.S.-E.C. Task Force on Biotechnology Research. Her work has focused on the development and adoption of new technologies that affect agriculture and the environment.

Cassandra Klotz-Ingram is an economist with the Economic Research Service, USDA. While pursuing her graduate work at UC Davis, she was a Joyce Fellow with the National Agricultural Biotechnology Council. Since then, she has continued research related ro the effects of adoprion of agricultural biotechnology as well as agricultural R&D issues.

Jean Buzby is an agricultural economist with the Economic Research Service, USDA. Her main area of interest is research on valuing the benefits of food safety risk reductions using contingent valuation, and cost-of-illness methods. In addition, she has researched orher diverse food safety issues including product liability for food poisoning cases, and international trade and food safety.

Donna Roberts has been an economist with USDA's Economic Research Service since 1990. Over the past three years her research has focused on technical trade barriers, including sanitary and phytosanitary measures. In 1996, ERS posted her to the U.S. Permanent Mission to the World Trade Organization (WTO) in Switzerland, where she continues her research and serves as a U.S. delegate to the WTO Sanitary and Phytosanitary Committee.

Randolph Barker is senior advisor to the director general at rhe International Water Management Institute in Colombo, Sri Lanka, and professor emeritus, Department of Agricultural, Resource, and Managerial Economics, Cornell University. His interest in water resource management began at the International Rice Research Institute in the Philippines, where he served as head of the economics program from 1966 to 1978.

David Seckler is the director general of the International Water Management Institute (IWMI). Before joining IWMI in 1995, he served for four years as director of the Cenrer for Economic Policy Studies, Winrock, and for four years as director of the Inrernational Center for Agricultural and Resource Developmenr, Colorado State University. He worked in India as a program officer with the Ford Foundation and in Indonesia as Policy Advisor to USAID.

Upali A. Amarasinghe is research statistician at the International Water Management Institute. He received his Ph.D. in statistics from the University of Illinois in 1991. Before joining IWMI in 1992 he was senior lecturer at the University of Colombo, Sri Lanka.

Adesoji O. Adelaja is professor and chair of the Department of Agricultural, Food and Resource Economics at Rutgers University and the director of rhe Food Policy Research and Outreach Institute. In recent years, he has developed a research program focused on the nutraceuticals industry. The research underlying his article with Brian Schilling in this issue flows from work completed as part of a USDA-funded study designed to examine the scope of the nutraceuticals industry.

Brian Schilling is a research economist in the Department of Agricultural, Food and Resource Economics at Rutgers University. In addition to working on issues pertaining to urban fringe agriculture and land use, he has conducted research on the business climate of food firms. In the area of nutraceuticals, he has focused on understanding the opportunities and challenges encountered by nutraceutical firms, as well as food and pharmaceuticals firms engaged in nutraceutical activities.

Christopher Delgado is a senior research fellow at the International Food Policy Research Institute (IFPRI), Washington, D.C. Delgado has over twenty years of experience in research and policy analysis on agriculture and economic development, with an emphasis on crop and livestock markering issues. He coordinates IFPRI's research program on promoting growth and diversification through markets for high-valued crop and animal products.

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Claude Courbois is a research analyst at the International Food Policy Research Institute and is completing his Ph.D. in economics at North Carolina State University. His work at IFPRI has focused on the role of agriculture in poverty alleviation in developing countries and on issues arising from rapid growth in consumption of livestock and fisheries products.

Roger Claassen is an economist with the Resource Economics Division, Economic Research Service, USDA. Specializing in conservation and environmental policy issues, Claassen's research agenda includes wetland policy issues, the role of land quality factors in agricultural land use decisions, distributional consequences of agro-environmental policy, and the value of information in agro-environmental policy design.

Ralph Heimlich is deputy director of the Economic Research Service's Resource Economics Division. Based on policy analyses of conservation and environmental programs before, during, and after the last three omnibus farm bills, Heimlich became concerned that fundamental links between commodity and conservation policy were wearing thin. His research interests include the efficiency of alternative instruments for improving agricultural's environmental performance, and the political economy of leveraging support for environmental programs.

Carolyn Dimitri is an agricultural economist with the Economic Research Service, USDA. Most of her work focuses on contractual relationships between growers and first handlers of different agricultural commodities, and how institutions arise to solve contracting difficulties. This interest has led her to explore institutional change in the late nineteenth and early twentieth centuries, with a special emphasis on agricultural economics history.

Joy Harwood has been chief of the Field Crops Branch at USDA's Economic Research Service since 1996. She was named "USDA Economist of the Year" by the USDA Economists Group in 1997. As a Legis Fellow for Senator Bob Dole during the 1990 farm bill debate, Harwood helped develop the crop insurance title and also worked on trade, conservation, and commodity program issues. She and husband Craig Jagger have collaborated on a number of professional projects, including their article on the farm safety net in this issue.

Craig Jagger has been an agricultural economist at the Congressional Budget Office (CBO) since June 1995. Along with two colleagues, Jagger is responsible for estimating the budgetary impacts for the Congress of legislation affecting agriculture. His current responsibilities at CBO are for the crop insurance, wheat, and export programs. He was a key congressional analyst in the 1995/96 budget reconciliation/farm bill debate.

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