



## Contributions of Economics to NIFA Priorities

### Food Production and Sustainability<sup>1</sup>

Sustainability of the capacity to produce adequate supplies of affordable food addresses the most basic of human needs. Society can concern itself with issues of the next order of importance, such as food safety, nutrition and dietary variety, only if there is enough food to go around. Think Haiti or a Darfur refuge camp. During the first half of the 20<sup>th</sup> Century, world population growth appeared to be outpacing growth in food supplies, and, on average, prices of key food commodities trended upward. However, for the 50 years following World War II, agricultural production increased more rapidly, and real commodity prices trended down. Much of the growth in production, especially in the U.S. and other developed nations, is credited to increased use of ever-improving inputs and rapidly rising productivity (output per unit of input). From 1950 to 1990, agricultural productivity grew at an average annual rate of over two percent. Since 1990, the rate of productivity growth in U.S. agriculture has slowed significantly, averaging less than one percent.

The half-century or more of increased production of food and declining real prices has contributed significantly to the alleviation of poverty and hunger worldwide. However, recent turbulence in food markets has reminded policymakers and others that ever-declining food prices are not guaranteed. Food prices influence the welfare of many people in the world, with rising prices having disproportionately adverse consequences for the world's poorest and most vulnerable people. More questions are being raised about the long term future prospects for food supplies and prices.

Global population is projected to increase by 2.3 billion people, about one-third, to 9.1 billion people by 2050. The FAO recently estimated that demand for food would increase by 70 percent by 2050, reflecting the effects of both population growth and rising per capita income. Our capacity to supply that demand is problematic. Is the era of ever-increasing agricultural abundance coming to an end? The answer turns on the future path of agricultural productivity, in the U.S. and around the world.

#### What Economists Can Contribute

Agricultural economists provide both the theoretical frameworks and long experience in applied research and analysis essential to answering important questions about the capacity of the world's natural resource base to meet future human demands on that base.

- Economists continue to evaluate the factors that have driven increased agricultural productivity up to the present, as well as the prospects for the continued influence of those factors on productivity in the future. Most of the world's arable land is now in production, meaning further increases in food production will have to come from sustainable increases in the productivity of that land, within the limits of other resources, such as water.

---

<sup>1</sup> Prepared by John E. Lee, Jr., based heavily on a series of articles in *CHOICES* Magazine, having the theme, "Agricultural Productivity and Global Food Security in the Long Run," by Julian M. Alston (University of California-Davis), and Philip G. Pardey (University of Minnesota) and colleagues. See References and Additional Reading sections of this paper.

- Economists have a long and credible track record in measuring the payoffs to public and private investments in agricultural research. The results of work in this area can provide invaluable support to the case for a strong program of public research and education in the agricultural sciences. This information can also help guide strategies for public investments in countries where agricultural productivity is lagging and natural resources are being stressed.
- Economists have examined the differences in growth in agricultural productivity among nations and at various stages of economic development and have identified many of the factors accounting for those differences. This knowledge will be essential in guiding public policies that will support continued progress in sustainable production to meet rapidly growing global demand.
- Economists have the skills and experience to assist the larger science community in optimizing the use of the natural resource base in achieving society's multiple demands on that base. The uses of resources for food production, energy, carbon sequestration, recreation and other needs can be designed to maximize complementarity rather than competitiveness among those uses.
- Economists have contributed greatly to the increases in agricultural productivity by helping producers to understand the most efficient and profitable combinations of available resources and technologies. Profitability, in turn, has made producers more willing to invest in productivity-improving technology, and it has been a major factor in agricultural progress in the U.S.

### **Needs and Opportunities**

The preceding examples of contributions economists have made, and continue to make, to the measurement and enhancement of agricultural productivity, also point the way for profitable investments in future research and education, as well as in more widespread understanding and use of economic information already available.

- Ongoing access by the USDA Chief Scientist, to economists who know and understand the literature on agricultural productivity and all its ramifications, will be invaluable to both the generation of support for the agricultural sciences and to the guidance of a more productive national program of research and education.
- Additional emphasis and support is needed for improving both the theoretical concepts and the data bases for productivity measures that are consistent with public expectations of the agricultural sector. For example, should the enhancement of the environment be considered a desired product of agricultural activity? If so, how does that goal get incorporated into measures of productivity?
- Economists involved as full partners in the NIFA processes of allocations of funds to research and education and in the coordination of R & E activities across Federal and state partners can make a significant contribution to assuring that funds go to uses most likely to improve longer-term agricultural productivity. This is even more the case if those economists are respected as authorities by their peers in economics and the biological and physical sciences as well as by the leadership in NIFA.

900 Second Street, NE  
Suite 205  
Washington, DC 20002  
Phone: 202-408-8522  
[www.cfare.org](http://www.cfare.org)



## References and Additional Reading

Special Issue of *Choices, The Magazine of Food, Farm, and Resource Issues*, 4<sup>th</sup> Quarter 2009, with the theme, "Agricultural Productivity and Global Food Security in the Long Run," Julian M. Alston and Philip G. Pardey, Editors. The issue and the articles can be found at <http://www.choicesmagazine.org/magazine/article.php?block=40>.

The *Choices* articles and authors include:

- "[The Shifting Global Patterns of Agricultural Productivity](#)," Jason M. Beddow, Philip G. Pardey, and Julian M. Alston.
- "[Structural Changes in U.S. Agricultural Production and Productivity](#)," Jennifer S. James, Julian M. Alston, Philip G. Pardey, and Matthew A. Andersen.
- "[Agricultural Production and Productivity in Canada](#)," Terrence S. Veeman and Richard Gray.
- "[The Production Performance of China's Transforming Agriculture](#)," Songqing Jin, Jikun Huang, and Scott Rozelle.
- "[Agricultural Productivity in Transition Economies](#)," Johan F. M. Swinnen, Kristine Van Herck, and Liesbet Vranken.

Alston, J. M., M. A. Andersen, J. S. James and P. G. Pardey. (2010) "Persistence Pays: U.S. Agricultural Productivity Growth and the Benefits from Public R&D Spending." New York: Springer, (in press).

Alston, J. M., B. A. Babcock and P. G. Pardey, eds. (2010). "Shifting Patterns of Agricultural Production and Productivity Worldwide." CARD–MATRIC Electronic Book, Ames, IA: Center for Agricultural and Rural Development, (forthcoming).

Alston, J. M., J. M. Beddow and P. G. Pardey. (2009a, September). "Agricultural Research, Productivity and Food Prices in the Long Run." *Science* 325(4), 1209–1210.

Alston, J. M., J. M. Beddow and P. G. Pardey. (2009b, revised September). "Mendel versus Malthus: Research Productivity and Food Prices in the Long Run." Department of Applied Economics Staff Paper No. P09–01, St Paul, University of Minnesota.

FAO (Food and Agriculture Organization of the United Nations). (2008, September). "Hunger on the Rise: Soaring Prices Add 75 Million People to Global Hunger Rolls." FAO Briefing Paper Rome: FAO. Available at <http://www.fao.org/newsroom/common/ecg/1000923/en/hungerfigs.pdf>. Accessed November 2008c.

Christensen, L. R. (1975). "Concepts and measurement of agricultural productivity." *American Journal of Agricultural Economics*. 57(5), 910–915.

Huffman, W. E. and Evenson, R. E. (1993). *Science for Agriculture*. Ames: Iowa State University Press.