

by Mitch Geasler, Associate Administrator; and Janet Poley, Director, Communication, Information, and Technology, Extension Service, USDA, Washington, DC

The flow of new technology has not been matched by adequate investments in the . . . institutional and human capacities necessary to use and control these technologies effectively. We now face needs for technology assessment, new institutional innovations and related human capital, and research on ethics and values. (Social Science Agenda Project, Michigan State University, March 1988)

Today, the mass of scientific knowledge and its availability to the public are increasing exponentially. However, data from most academic testing programs document that, in general, scientific literacy is low, and the general public does not have a deep understanding of the biological and physical sciences.

There is an old Chinese curse that says, "May you live in interesting times." Whether the interesting 1990's are recorded in history as a time of curse or promise depends on science—and the public's reaction to and understanding of science in the policy context.

Agricultural scientists increasingly recognize the challenges and opportunities presented in this age of environmental conscious-

ness, increasing information, and public participation, and that recognition is giving rise to new thinking and actions.

Education of the public through the Cooperative Extension System, other institutions of youth and adult learning, and the private sector is essential. Sound long-term policy will be shaped in the United States only if the public understands the challenges that face agriculture and food systems and the potential benefits of science and technology.

Today's agricultural leadership, within USDA and across the Nation, sees that agricultural science is not an island. The Cooperative Extension System is aggressively pursuing an issues-based programming approach, including a strong emphasis on environmental issues. New partnerships are being created between governmental and private stakeholders with immediate and long-term interest in learning about and solving problems.

Charles Hess, Assistant Secretary of Agriculture for Science and Education, has said that agri-

culture must go beyond a simple preoccupation with the biological and physical sciences. According to Hess,

Powerful outside forces often have both positive and negative effects on agricultural research and its use. These outside forces affect not only the way in which we do our work, but what work we decide to do. Research and production policies are not formulated in any pure and solitary test tube. They spring from the messy and often disorderly real world of conflicting demands and unclear choices. We no longer operate—in fact, we probably never really did—in isolation from an increasingly concerned public. Our course is continually influenced by the changing winds of public opinion and national and agricultural policy.

Social scientists are bringing new and important understanding about human behavior, beliefs, and values to the agricultural science community. The Cooperative Extension System is well positioned to listen to local concerns, bring research-based information to bear on problems, and help communities solve environmental issues.

Today's agricultural researchers and educators are just as likely to be surveying consumers about their perceptions of food safety or water quality as they are to be concerned about questions of production. Through application of social science research methods, USDA and the land-grant community are developing more effective and meaningful ways to present complex, technical, and some-

times ambiguous information to the various publics they serve.

Nils Hasselmo, President of the University of Minnesota, had this to say about the challenge of change:

We stand on the dividing line between two decades. Between a decade of questions and what must be a decade of answers. Between a decade when the world and the Nation realized that change was coming, that change was necessary, and that change was possible, and a decade that must deal with the consequences and opportunities of change.

Science is essential to finding these answers. Webster defines science as “knowledge obtained by study and practice.” Scientists are concerned with observing and classifying facts leading to the establishment of verifiable general laws. Few would argue that science or scientists are perfect, but the notion that knowledge can be obtained without systematic study and practice seems ludicrous.

Public Understanding of Science

According to the American Institute of Biological Sciences (AIBS), by last count the tree of biology had more than 60 named branches. Each branch is growing vigorously in its own direction, each with its own agenda and goals.

In one sense, this can promote healthy diversity and growth; in another it is an open invitation to misunderstanding, confusion, and rejection of biology and its work on the part of the U.S. public.

Paul Ehrlich of Stanford University, a recent president of AIBS, had this to say about the role of science and scientists in relation to pressing environmental issues facing our society:

Biology is intrinsic to the sustainability and survivability issues of a global nature that now greatly impact whole organisms, populations, and their ecological settings. These range from the loss of biological diversity, spread of rogue pathogens, global warming, desertification, population growth, ozone depletion . . . Yet today, there are vastly more lawyers, economists, sociologists, and even accountants working on these problems than trained biologists. Is it any wonder that many citizens in general have no appreciation of the highly skilled work of professional biologists?

Our Information Society

Adding to the complexity of the issues is the explosion of information, including computer and global satellite communication, which exposes all segments of society to a much broader array of data. In the privacy of our homes, people watch the events of the day, including frightening messages of environmental doom.

James Moseley, USDA Assistant Secretary for Natural Resources and Environment, has said that this constant media barrage affects people, influencing them to question and, in some instances, no longer trust government, business, and institutions of higher education. "The result," as he sees it, "is that people come to

rely on 'we-trust-what-we-know' and 'less-is-better' attitudes."

Assistant Secretary Moseley sees more and more citizens demanding and getting a greater voice in the issues that concern them. He believes that these trends mean that people want a voice in the decisions that affect their daily lives. And if long-standing institutions don't give them immediate and satisfactory responses, citizens will respond. He compares the amount of public involvement in development of the 1990 food and agricultural legislation, as contrasted with the relatively limited involvement in 1985:

Agriculture clearly was not the only player in writing farm legislation. Environmental groups concerned about agriculture decided they needed not only to participate in the writing of the legislation, but to drive the process as well.

Listening to the Public

Daniel W. Bromley, Anderson-Bascom Professor of Agricultural Economics at the University of Wisconsin-Madison, concluded an article in the July 1990 "Economic Issues" by stating two alternatives for dealing with public concern over science and agricultural research.

He said that scientists can "hunker down" and denounce that the public interest in science is an unwarranted intrusion into the halls of academe. He states that down this road lies ruin,

since public funds are used to support research.

Bromley suggests that a more promising route is to accept a legitimate public interest in research and technology. This route requires the research establishment to admit the collective interest in its activities and take steps to incorporate these interests into its agenda.

According to Leon Kass, Luce Professor at the University of Chicago,

Politics is always about moral questions. We're always trying to figure out what the better or just or right or decent thing to do is. For better or for worse, in a liberal democracy, these expressions of the beliefs and practices and values of the community are best expressed through serious discussion with the populace in the legislature and in local communities.

David Meeker, of the National Pork Producers Council, argues that while the scientific community is generally highly regarded today, it must do a better job of communicating. He asked that principles be stated in understandable terms and that predictions of the impact of new developments be realistic. He urged treating the public with respect, addressing their concerns, and answering their questions.

S.K. Harlander, Professor of Food and Nutrition at the University of Minnesota, says that it is important to bring together groups with divergent opinions even though the process may be painful.

He states that these groups do not need to control the research agenda, but their input should be actively sought and acknowledged.

He goes on to suggest that not all scientists and administrators need to participate in this process. "Individuals who are compassionate, sensitive to the needs of people, and unafraid of being challenged should be encouraged to participate."

Thomas Hoban, sociologist at North Carolina State University, says that decisions about research goals, clients, Extension efforts, and farm commodity policy must now be made with an eye toward the larger public, both rural and urban. "Consideration of these effects, and these nonfarm publics, must increasingly be a part of the agenda for decisionmakers from USDA down to the bench science level."

Studying Attitudes and Beliefs

Recent work at Colorado State and Cornell Universities highlights the importance of understanding the varied values, beliefs, interests, and attention spans of different audiences.

This work cautions scientists and educators, convinced of the logic and importance of their messages, against trying to convey a single version of a message to a perceived homogeneous, faceless public. Urban consumers as an audience may pose special com-

munication challenges to agricultural scientists and educators.

In the National Research Council publication *Improving Risk Communication*, the authors challenge the view that risk communication is successful to the extent that recipients accept the views or arguments of the communication. Rather, they define risk communication as being successful when it “raises the level of understanding of relevant issues or actions for those involved and satisfies them that they are adequately informed within the limits of available knowledge.”

P.M. Sandman, writing for the Environmental Protection Agency, stresses that the ultimate goal of risk communication should be to develop a public that is alert to the issues and rational in its approach to them. He indicates that the public sees risk as much more than the probability of a loss. Qualitative factors such as the fairness of the risk, the level of control one has over the risk, and the degree to which the risk is voluntary must also be considered. He describes these factors as “outrage” factors. When the public pays little attention to the strict probability of a hazard, and the experts ignore outrage, then it should come as no surprise that the two groups rate risks very differently.

Public Participation in Technology Transfer

As the public participates more

broadly in shaping policy, it becomes even more essential to understand the various stakes individuals and groups hold relative to the issues. Who benefits and who is affected—small and large producers, private sector companies, consumers.

Most members of the research and education community believe that discussions should be grounded in science. But, as we have suggested, these questions are as much social and political as they are about scientific research and information alone. The political perception and value dimensions of the issues are critically important in understanding public reaction.

Multidisciplinary Cooperation

Researchers and educators in the various science disciplines continue to respond to this broadening of public participation and the need to provide accurate and effective information to the public. Increasingly, USDA and the land-grant community are creating new structures and incentives to encourage cooperation between the natural and social sciences.

The Experiment Station at Michigan State University began an initiative in 1990 to do just that. Robert Gast, director of the Michigan Agricultural Experiment Station, indicates that social scientists must become more involved with their biological and physical science colleagues to

solve far-reaching environmental problems, such as those related to ground water quality, food safety, solid waste management, and pesticide residues.

Kenneth Corey, dean of Michigan State's College of Social Science, believes in a bold approach, given the quickening pace of society. He says:

We can sense problems quicker, we can analyze data quicker. Problems are more urgent now, and we have to think with a sense of urgency. We need more

linkages like this between institutions, between governments, and between institutions and governmental officials. We need to mine the richness of people's experiences to make our teaching and research that much richer. This is not business as usual.

As researchers and teachers from various disciplines work together to deal with complex issues of society, and as communication improves, we must be able to apply technology for the betterment of all people. ■