National Academies Workshop
Exploring a Vision: Integrating Knowledge for Food and Health
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Opening Address

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Thank you for inviting me to participate in this visionary workshop. Earlier this year I spoke at Secretary of Education Rod Paige's Math Summit, and expounded on my passion for mathematics. And just last week I restated my love for physics at Fermi National Laboratory. But I will have to admit that food takes precedence. It is a very important part of my life, and yours as well.

The link between food and health is pretty obvious. If you don't eat, you get sick and die. Consequently, the most important food/health issue is providing enough food for people to satisfy their basic nutritional needs. I need not tell you that even after 10,000 years of agriculture, this issue has not been resolved. Yes, "we" have the ability to satisfy hunger throughout the world. But even in our own country, the wealthiest in the world, at the height of the boom economy in 1998, 3.7% of U.S. households were hungry at some time during the year. On a typical day in 1998, this occurred in about 0.6 percent of households. This did not happen because there is not enough food, it happened because these households did not have enough money. Last year, lowest income families spent over a third of their income on food, compared with less than one tenth for the highest income families.

World wide, as everyone knows, the situation is worse. An estimated 840 million people in developing countries subsist on diets that are deficient in calories. Roughly 826 million people are undernourished. It is an oversimplification to say that simple poverty is the reason here too, because poverty has its own deeper causes.

I mention these well known and very disturbing facts at the outset because physical and mental well being depends first and foremost upon getting enough to eat, and the most important food/health issue has nothing to do with nutrition science, or food borne diseases, or opportunities created by genetic engineering. The most important issues are social and economic, and they are notoriously difficult to address.

Leaders who struggle to reduce poverty and hunger are limited in the resources they can bring to bear to help their people. While science alone will never solve the problem of hunger and malnutrition, science can provide tools to assist the effort. The history of food production, paralleling exactly the history of civilization, is a story of steadily increasing productivity. The first big step, from hunting and gathering to agriculture, made civilization itself possible. Thereafter agriculture became the primary focus of technical innovation within society, only defense (and, unfortunately,

aggression) engendering comparable ingenuity. In our scientific era agriculture has experienced the most dramatic productivity gains of any human endeavor.

In the U.S., large highly productive farms own a small fraction of farmland, but produce a disproportionate share of farm sales. In 1900, 17% of farms produced 50% of farm sales. A century later only 2% of farms (46,100 operations) produced half the sales. The number of farms is shrinking: in 1935 there were nearly 7 million farms in the U.S. compared to 1.9 million in 1997. Many technical improvements enhanced crop yields during the past half-century, and we will probably need them all and more just to keep up with the growing world population, estimated to increase from today's 6 billion to about 8 billion in 2030. This is a huge number of people to add in a very short time. Currently available technology may make it possible in principle to feed them, but the practice is something else again. Traditional patterns of land use, water management issues, and cultural attitudes toward agricultural technology are already inhibiting the application of known productivity enhancing practices in regions throughout the world with growing populations.

How these productivity gains came about is an interesting story because today we rely much more on formal scientific investigation than in the past to suggest new approaches and techniques. Application of modern chemistry, biology, and computing to agricultural science has accelerated the pace of productivity. But possibly even more important than the new technology is the problem of how to get the technology used. Education in the broadest sense is necessary to overcome resistance due to ignorance or simply lack of skills or awareness of available resources. Public education is equally important to gain acceptance for new food products that may be healthier for people and for the environment, but result from technologies that are stigmatized as foreign to cultural traditions.

I am stating these very basic issues at the outset of this conference to emphasize that the narrower problems of food and health do not occur in a vacuum. One of the values of coming together in interdisciplinary gatherings is to raise awareness of the broader context in hopes that solutions may emerge that have survival value in this difficult and even occasionally hostile environment.

My office, of course, was conceived to foster interdisciplinary cooperation among agencies. We work with all the agencies and the Office of Management and Budget to ensure that federal programs in science and technology, including food and health, are serving national needs. OMB does not track food related R&D, but clearly most of USDA's programs totaling about $2 billion would be included. Food related programs in NSF, DOE, NASA, DOI, DOC, EPA, NIH, and DOD would likely add about another $500 million. Managing this investment requires active interagency coordination, the primary mechanism for which is the National Science and Technology Council. Most food related issues would fall under one of the four standing NSTC Committees – the Committees on Science; Environment and Natural Resources; Technology; or Homeland and National Security.

Under the NSTC umbrella we currently have interagency efforts on plant, animal, and microbial genomics. We also have coordination efforts on food safety issues such as dioxin and mercury. We have a Joint Subcommittee on Aquaculture. Our new Committee on Homeland and National Security will address R&D related to anti-terrorism and protection of the food supply. Other interagency groups are coordinating efforts in climate change, agricultural biotechnology, and water.

The social and technical contexts of food production, processing, and distribution are changing very rapidly, and these changes are challenging the ability of governments, educators, and policy organizations around the world to keep up. Workshops such as this are important for assessing the issues and opportunities, and raising the salience of good ideas.

I wish to thank the organizers of this event, and the National Academies for hosting it. I particularly thank the panel members for giving their time and their insights.