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The second annual meeting of the National Agricultural Biotechnology Council (NABC), Agricultural Biotechnology, Food Safety and Nutritional Quality for the Consumer, was held in June, 1990, co-sponsored by the NABC and the Agricultural Research Institute. The selected topic was without doubt a timely one. Increasing media attention given to food safety and food quality has mirrored skyrocketing consumer concerns in this area. In the year of the first United States approval of a genetically-engineered product for use in food production (a microbially produced enzyme for making cheese), the coming of biotechnology to the food arena has not gone unnoticed. One example is the intense public debate that accompanied the introduction of a growth hormone for use in milk production. Genetic engineering techniques provided a plentiful supply of bovine somatotropin (BST), a growth hormone that improves efficiency of milk production in dairy herds. However, the expressed public concern about its use resulted in at least a temporary

NABC/JOYCE FELLOWS
Candace W. Collmer
Boyce Thompson Institute
with
Harrison L. Flint
Iowa State University
Russell C. Parker
U California, Davis

NABC/JOYCE GRADUATE FELLOWS
Cassandra Klotz
U California, Davis
Johan Swinnen
Cornell University

ban in some parts of Europe, and if approved by the Federal Drug Administration (FDA) it will be initially banned in some parts of the United States.

In its 1990 meeting, the NABC continued to provide a neutral forum for the expression of diverse viewpoints. Here representatives of different interest groups together explored issues related to applications of biotechnology to food quality and food safety, with particular emphasis on consumer perceptions and receptivity. That diverse viewpoints were expressed is documented later in this report in the invited talks and summary reports from the workshops. This opening chapter presents an overview as well as a

“sense of the body” as a whole that had developed by the closing of the two and a half day meeting.

Through the course of the meeting, participants were presented with specific examples of numerous potential benefits that applications of the “new” biotechnology can bring to food safety and food quality. Biotechnological applications promise a wide range of advances, including leaner meat, enhanced flavor, quality, and processing qualities of foods, more effective monitoring for possible microbial contamination in the current food supply, and reduced pesticide usage on food crops. It is noteworthy that several promises of the past are now products ready for use in food production. The first genetically-engineered, food-grade microbe, a baker's yeast with enhanced leavening properties, has just obtained regulatory approval in Europe. In addition, the FDA has just approved Chymosin as the first product produced by a genetically engineered organism for use in food production. According to Susan Harlander, food microbiologist from the University of Minnesota, Chymosin is “nature identical” to the enzyme rennet which is isolated from calf stomach, but it is purer, in more consistent supply, and microbiologically safer (see Harlander, page 145). There is little disagreement that this represents an advance in both the means and the ends of the production of enzymes useful in food production. The DNA probe technology described by George Parsons, Director of Diagnostics at GeneTrak Systems (see Parsons, page 118), with its increased sensitivity, detects more quickly and earlier in the production process microbial contaminations thereby significantly improving the safety of our food supply.

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However, as pointed out repeatedly from the beginning to the end of the meeting, some of the first seeds of the new biotechnology are falling on unexpectedly barren ground. Stated quite simply, society has thus far failed to embrace the scientist's perception of the value of the new biotechnology in the food arena. Given the truly powerful potential of biotechnology to address important consumer concerns about the food we eat, keynote speaker Carol Tucker Foreman, a partner in the consulting firm Foreman and Heidepriem, addressed the question on the minds of many meeting participants: Why aren't the crowds cheering in the streets? Her answers were thought-provoking, and their themes (lack of trust, value conflicts, unequal distribution of benefits and risks, failure to communicate) were reiterated throughout the meeting (See Foreman, page 74).

First, public mistrust of scientific advances is rampant, most probably having been fueled by past experience, when the Better Living Through Chemistry motto of the 1950s saw some products brought to market without ad-

equate prior evaluation. Accordingly, while the promises of DDT, aerosol sprays and nuclear power were acclaimed at the time of their introduction, it was only later, and sometimes much later, that negative impacts were experienced and belatedly acknowledged. As a result, there exists a public concern that biotechnologically-derived food advances also may bring with them unannounced environmental or health risks. "Natural" foods sound more appealing. There is little interest in "new/manufactured" foods unless they can be guaranteed to be safe and healthful.

Secondly, there is a public perception that the risks and benefits of the new biotechnology may be unequally distributed. In such a view, the public bears the (perceived) risks while someone else—the farmers, food processors, scientists or biotechnology companies—gain the benefits (profits). Surprising to many participants, "scientists" are now defined as outside the group of "concerned citizens". On some issues related to biotechnology there exists a true conflict of values among different interest groups. Something that is scientifically sound, and environmentally and nutritionally safe, may have social or economic consequences that are unacceptable to certain segments of the population. Such is certainly the case with the growth hormone BST, once questioned only in terms of milk production efficiency, and animal and consumer safety. The BST debate now is about social and economic conflict and not about science, although the demand for greater and greater proof of safety remains. Yet many participants were surprised at the range of values they shared with other participants identified as being in a different group.

Third, the public appears to have lost confidence in the governmental institutions it once counted on to resolve questions of safety and conflicts between scientific, social, and economic viewpoints. The deregulation of the Reagan era coupled with the scandals in the Environmental Protection Agency (EPA) and other governmental agencies resulted in a loss of faith in the government's ability or desire to protect the public's environment, air, or water, and now, its food supply. The 1990s has a concerned citizenry that has lost faith in the authority figures it once turned to for information and protection. While public confidence is low, Peter Barton Hutt, Esq., a partner at Covington and Burling, when reviewing government regulations related to food safety stressed the adequacy of existing laws to cover biotechnologically-derived foods and food ingredients. (See Hutt, page 154).

Other speakers pointed out that social and demographic issues as well as health and fitness concerns are bringing an additional charge to the food arena. The aging baby-boomers are becoming more concerned with

healthy foods and ever increasing numbers of working mothers demand both fast but also nutritious foods to accommodate changing family lifestyles. These trends are evident in new food marketing strategies where foods for the first time are being differentiated, and successfully marketed, on the basis of safety and quality.

However, the current lack of stringent food labeling guidelines, a scientifically undereducated public, and a loss of faith in traditional "experts" has resulted in a marketplace that is emotional and highly volatile in terms of food issues. Several speakers agreed that the current marketplace is one in which "perception has overtaken fact" in regard to food issues. This is perhaps best documented by studies which show that the public's ranking of various food-related "risks" based on perception of relative danger, is in fact almost perfectly inverted in comparison to a ranking based on actual occurrence of illness or death and scientifically determined "risk factors" (See Pariza, page 167). The obvious, imminent danger of such a climate is that decisions about product acceptability, and regulations for products derived from biotechnology could be made based on such misperceptions rather than on scientifically-derived data about product quality and safety. Lester Crawford, Director of the Food Safety and Inspection Service, United States Department of Agriculture, made clear that safety determinations must be based on science, but science open to public scrutiny (See Crawford and Clarke, page 161).

Over the course of the meeting, it became clear to what a great extent all concerned parties in the food arena have failed to talk with each other, much less communicate. And perhaps because every person in society deals with food on a daily basis, the list of stakeholders or "concerned or involved parties" (the scientific community, the government, and the food industry) have not only failed to listen to the public but have done a poor job in bringing their messages to the citizenry. Not only did scientists and technologists come before the public with misperceptions of the general attitude in present society towards technology, its products, and the institutions that produce and control it, but also their messages were often couched in a "hype" that only tended to rouse suspicions. America's citizenry is not particularly well-educated scientifically and many have found it difficult to understand the science behind the new technologies or simply "tune-out" to science. It is not surprising that what is not understood is feared and/or rejected.

The "hype" needs to be dropped and the whole spectrum of issues related to biotechnology and food needs to be quietly discussed and carefully evaluated. In order to reach meaningful resolution, all voices must be heard. However, all parties must first be "educated" so that a true dialog between all concerned parties, including the consumer, is possible. As stated succinctly in closing remarks by NABC Council member Robert Barker, Cornell University's Senior Provost, "All need to speak, all need to listen, all need to learn" (See Barker, page 27).

Before dialog can begin, all stakeholders need to understand both terms (definitions) and concepts which are currently unfamiliar. For example, the consumer and farmer must learn about scientific technologies to join the discussion with an equal voice. It also must be recognized that consumer opinions, however, varied, must be treated with respect. At the same time, scientists and food producers need to be educated about the relationships between scientific advances and the public interest. They need to assess the impact of "unanticipated effects" of biotechnology and become sensitive to the fact that all scientific advances inevitably change society. While it appears that the implementation of agricultural biotechnology will merely continue the already present trend toward an increasingly technological agricultural system, it does not follow that every new technology should be adopted. It is no longer acceptable to assess the effects of a technology after the fact. Risk assessment, impact assessment and public involvement need to be started early in the research process and continued through to commercialization.

Government regulators also need to be part of these discussions, particularly as the parties struggle to resolve the issue of the degree to which regulations, now based primarily on science, should be informed by social issues. Farmers, too, must come into the dialog. Ann Sorensen, Assistant Director of the Natural and Environmental Resources Division of the American Federation of Farm Bureau, reported on studies that indicated that farmers both need and want to interact with consumers to learn what it is they really want (See Sorensen, page 103). Thus we return full circle to the need for consumer "education" from which the public can better understand about agricultural practices and realistic options (for example, limited pesticide usage versus blemished fruit) so that valid choices can be made.

The economists and marketing people made it clear that it is no longer in question if the consumer will participate in making the choices regarding biotechnology and foods. The consumer has spoken, and will continue

speak, in the marketplace. It became obvious to those in attendance, that the consumer, the farmer, etc. needs to be involved in planning and prioritizing research related to agricultural biotechnology from the earliest stages. It is vital to identify the real concerns of each group, the real parties of action and find real ways to address concerns. Both the benefits and the risks should be discussed and fully assessed. In addition, the consumer needs to understand the technical process of risk assessment currently utilized in the food industry. And scientists, regulators and others need to understand the process of individual and personal risk assessment. Further, all need to distinguish from "zero risk" from "acceptable risk".

One conclusion arising from the NABC meeting is that there exists a pressing need for a "mediating organization" both nationally and at local levels where issues can be examined from many diverse viewpoints in a neutral forum. While "education" of all concerned parties is a prerequisite for such a discussion, it should not be expected to eliminate differences in values among the different groups. The challenges of structuring such a forum are great as some very basic questions at the moment have no answers. For example, who can speak for "the consumer"? Who will establish "the facts"? Do all professionals have vested interests? Given that the values of government regulators, scientists, industry officials, farmers and consumers can be very different, is it possible to find shared values common to all?

While the challenge of consensus building among all concerned parties is great, the consequences of failing to interact and dialog together may even be greater. What could be at stake is the budding agricultural biotechnology area in the United States and its potential to benefit all segments of society. What is possible is an implementation failure due to a lack of public acceptance, not a lack of scientific expertise. The demand for feeding an ever increasing world population coupled with ever increasing stresses on the environment insures that newly developing agricultural biotechnology will be utilized in the world. For example, BST technology was developed in the United States but was first used with government approval in Russia, Czechoslovakia, and our neighbor—Mexico.

Mediating forums are needed where all concerned parties can meet with mutual respect and lowered voices to work together. The forums must consider issues in addition to safety including economic and social ones. Acceptable protocol for evaluation of individual products and processes of agricultural biotechnology need to be developed and periodically revisited. One model for such a protocol may be the updated decision tree presented recently by

the International Food Biotechnology Council (IFBC) and discussed by keynote speaker Ian Munro, Director of the Canadian Centre for Toxicology, for use in safety evaluation of foods derived using genetic modification (see Munro and Hall, page 64). Whole foods, whether biotechnologically-derived or not, and complete diets need to be evaluated for safety.

Keynote speaker Foreman made three proposals for increasing public trust in the area of food-related biotechnology (see page 74). First she suggested that President Bush state clearly that the first priority of government is the health and safety of the American people and that food biotechnology will continue only if it is deemed safe. Second, regulatory procedures related to food biotechnology should be changed to support an active level of public participation including environmental and consumer activists, state and local public officials, and the citizenry at large. Finally, she envisioned a mediating institution where the public could watch individual scientists and individual proponents of food and environmental safety working side by side to find common ground. Such an approach powerfully defuses controversy and tacitly invites the public to join the search for a workable solution to what then becomes a shared problem.

By the close of the two and a half day meeting, the need for a vehicle(s) to foster increased communication about agricultural biotechnology in relation to food safety and nutritional quality was clear. There also surfaced a clear need for all concerned parties to better understand the biological, institutional and social constraints and incentives now facing agricultural biotechnology. Exactly how those concerns will be addressed for the benefit of society is possibly the single most important challenge of the 1990s.

