Martin (moderator): Good evening ladies and gentlemen. I am delighted to welcome you to NABC 5. The title of this conference is "Agricultural Biotechnology: A Public Conversation About Risk." Instead of having an after dinner speaker this evening, we will have a roundtable discussion regarding public concerns about biotechnology and its potential risks and benefits. I will follow a talk show format and interact with a panel that I will introduce to you in just a moment. By the time we conclude later this evening I hope you will be saying "I am glad that I came. I am glad to be a part of this conference. I am looking forward to hearing the plenary session speakers. I am especially anxious to enter into a dialogue in each of the four workshops on Thursday and Friday." This evening's panel will offer an opportunity to set the stage, to excite you, and to increase your interest in the conference theme: "Agricultural Biotechnology: A Public Conversation About Risk."

Let me briefly describe how we are going to proceed. I have a basic script that I intend to follow. I have shared with each of the panel members the general theme, but they don't know the questions that I will ask, so the discussion will be extemporaneous.

Let me introduce our panel members. Lilly Russow comes from the Department of Philosophy at Purdue. Seated next to her is Rosetta Newsome from Chicago, where she is with the Institute of Food Technologists and is Director of Scientific Affairs. Seated next to her, is Rebecca Goldburg from the Environmental Defense Fund in New York. Bill Greenlee is the Head of the Department of Pharmacology and Toxicology in the School of Pharmacy at Purdue. Ann Sorensen comes from the American Farmland Trust where she is the Director of the Center for Agriculture in the Environment. Ted McKinney is from Indianapolis. He works for DowElanco, a relatively new joint venture between the Elanco Division of Eli Lilly and the Dow Chemical Company. Karen Bolluyt is from Iowa State University, where she is the Director of the Agricultural Information Service. David Judson is a journalist with the Gannett News Service, based in the Washington, DC area.

As you can see, we have people with very interesting and diverse backgrounds. You will have a chance to work closely with them on Thursday and Friday. They are going to serve as co-chairpersons for the four workshops. You also will hear from each of them in the wrap-up Session on Friday afternoon.

With this introduction, let us begin the evening program. Everyone travelled to this conference. Of course, some of you came from further away than others. Some only had to travel a short distance in West Lafayette, while others came from various places across the United States. No one chose Amtrak, although we do have service in Lafayette from Chicago to Indianapolis. How many came by commercial plane? About half the group. How many of you drove? Another half the group. Rebecca Goldburg, why did you decide to fly?

Goldburg (Environmental Defense Fund): Mainly because it takes far less time than any other mode of transportation. Also, it's relatively safe.

Martin: Good, she gave us two reasons: relatively safe and efficient in terms of time. Let me ask Ted McKinney the same question. Why did you decide to drive?

McKinney (DowElanco): The same reasons. It is far more efficient to drive the one hour from Indianapolis, and it's fairly safe.

Martin: David Judson, you came from Washington, DC. Why did you choose to fly?

Judson (Gannett News Service): It's a logical, efficient, quick way to get here.

Martin: Karen Bolluyt, did you drive over from Ames or fly?

Bolluyt (Agricultural Communications, Iowa State University): I flew.

Martin: You flew. There are some people here from Ames who drove. It took them about eight hours to drive. You chose to fly. Why?

Bolluyt: Because it was quick.

Martin: Rosetta Newsome, did you drive from Chicago?

Newsome (Institute of Food Technologists): Yes, I did, but had I realized there was Amtrak service, I might have considered that.

Martin: One of the choices that these individuals made in coming to this conference was how to get here. Some of you considered economics; some considered the time and convenience factors. And some considered risk. Let me give you some statistics about travel risk. In the United States, there were 515 fatalities in 1989 for those folks who traveled by Amtrak. If you'd known that, Rosetta, do you think that you would have come by Amtrak from Chicago?

Newsome: No, I would have considered the ease of getting here.

Martin: Also in 1989 there were 278 fatalities on U.S. commercial airplanes. Someone commented that travel by air is relatively safe. Does anyone want to guess about how many automobile fatalities there were in 1989?

Goldburg: 50,000.

Sorensen (American Farmland Trust): Much higher...

Martin: Like 100,000 maybe.

Russow (Philosophy Department, Purdue University): At least.

Martin: What do you think, Dave?

Judson: I'd say 75,000.

Martin: There were 46,000 passenger car fatalities in 1989. Ann, I understand that you drove down. I recall that in visiting with you on the telephone you said you prefer not to fly.

Sorensen: I am a nervous flyer; I am well aware that flying is safer than driving. It's an irrational fear of flying, but I drive when I can.

Martin: So here we have a scientist that knows the facts about the risks of travel but tells us that sometimes emotion plays a factor. We're going to talk about this during this conference. Let me move on now to another issue. Many Americans are concerned about food safety, particularly pesticide residues. Let us talk about food safety. I did some shopping. I bought a tomato. As far as I know, this one was produced with the application of pesticides. Lilly, would you eat this tomato?

Russow: I wouldn't buy it at a grocery store, but I would eat it at a restaurant.

Martin: Did it worry you that the salad you ate at the banquet tonight had tomatoes in it that might have been grown with pesticides?

Russow: Not really, I don't think it's much of a risk. I think it's much less of a risk than I took driving over here. But when I do have control over things, 1 don't buy things like that.

Martin: So, even though you know some of the scientific facts, you do make choices based on factors other than science.

Russow: I do.

Martin: If you had a chance to get a tomato from your garden or from a neighbor's garden that you knew was grown with minimal or no pesticides, would you prefer that tomato over one from the store that might have some pesticide residue.

Russow: **Yes.**

Martin: Let me turn to Rebecca Goldburg and ask the same question.

Goldburg: I think my response is quite similar to Lilly's. When I can buy food without pesticides, I try to but I certainly often buy foods that were grown with pesticides.

Martin: So you weigh in your own mind the risks and try to make a reasonable choice.

Goldburg: Yes, plus price and other factors.

Martin: Remember, David Judson is a writer for the Gannett News Service, and he often writes about science. David, let us assume that you have been assigned by your editor to write a news story about tomatoes and pesticide use. How would you tell the story? What do you think the issues should be, particularly about risks that maybe associated with this food?

Judson: I first would raise the question: Is the tomato good or bad for you? I think the context is probably the most important thing, i.e., the risk of eating a tomato against the risks of driving a car, of living in a house with lead-based paint, of living in a city like Washington, DC, or whatever. There are risks all over.

Martin: Ted McKinney is trained in agriculture and works for DowElanco, a company involved in agricultural chemicals. How does your company inform the public about the relative benefits and risks of the use of pesticides in tomato production, or in agriculture in general?

McKinney: It is particularly challenging because of the public perception. I think the perception is so strong about the perceived negative aspects of pesticides relative to many other things that we all use in our daily lives that it is a huge task. We don't believe in industry that we can afford to just turn on the airways like a media campaign and move the dial over because 51 percent doesn't win. As a result, we try to build coalitions; we try to work with those who are informed such as the media. We believe that facts and science will win despite what seems to be an overwhelming task as it relates to public perception.

Martin: Let me reach into my sack again. I found another tomato! This one could be called "Flavr Savr™," one that enhances shelf life. The company that developed this type of tomato is Calgene. Many of you have been hearing

about this, I am sure. Some of you may have worked on the research related to this type of technology. Now we are talking about biotechnology, or genetic engineering. This tomato is going to have a better flavor, more like that garden variety you were talking about earlier. And it will have a longer shelf life. Let me ask the same questions. How does that sound to you, Lilly?

Russow: It depends on how it was grown. I want to know where it came from and about pesticides used on it.

Martin: So information is important to you.

Russow: Yes.

Martin: Rebecca, what would you say?

Goldburg: I must admit if Food and Drug Administration approves it, I am going to try it.

Martin: Rosetta, what about the food industry? How are they going to relate to this new tomato?

Newsome: I can't speak for the food industry, but I think many consumers wish to have a tomato that tastes like the garden variety. They wish to have the tomato available year-round, they are anxious to have a good-tasting tomato available in the winter. Thus, the food industry would benefit by making a product available for purchase.

Martin: Karen, let us assume you are working on a story at Iowa State University. You want to tell a story to the consuming public through the *Des Moines Register,* a widely read newspaper in Iowa. What would you would want to say about this new tomato?

Bolluyt: My job at the College of Agriculture is to talk about what we know. It is also important that I keep in mind that what we know is only part of the story. The story should show respect for people for whom that knowledge and that information is not enough. Their value system is different than the one which is motivated primarily by what we know about the tomato in scientific terms.

Martin: I did some more shopping. I found another tomato. This one also is a genetically engineered tomato. *Bacillus thuringiensis (Bt)* protein gene has been introduced into this tomato. I don't need to explain to this audience what *Bt* is, or how it works, but I do want to talk to the panel a little bit about

this tomato. I am going to start with Lilly again. Would you be interested in eating this tomato?

Russow: I am going to sound like a broken record. I want to know how it was grown, what's in it, and so on. I think that consumers are tired of the "here's a tomato, it's just like every other tomato; trust us...buy it."

Martin: So you would like some labeling information, perhaps?

Russow: Definitely.

Martin: Maybe at the grocery store in the vegetable section there should be an information sheet that the customer could pick up and take home. Rebecca, let me ask you the same question I asked Lilly.

Goldburg: Information would be important to me. I am actually in a situation where I have published a paper on the toxicology of *Bt.*

Martin: It is interesting that you mention toxicology. I have a question for Bill Greenlee. As you recall, he is a toxicologist. Are there toxicological issues that we should be concerned about? What are some of the issues we should look at to assure the public food is safe and to help them make more informed decisions.

Greenlee (Pharmacology and Toxicology Department, Purdue University): I think one of the issues that was a recurring theme in both Ted and David's comments was the potential adverse impacts on human health. The other issue is how it is grown. Were pesticides used? Clearly, pesticide use and its chemistry has evolved. We are using far fewer amounts of pesticides per acre today. It really boils down to an issue of dose. What is the exposure dose? What is the likely dose from the consumption of the tomato? Do you consume them all the time? Pesticides are likely to represent a very small residue on the tomato. We might ask how the fruit was handled in the store. There are a number of factors that need to be considered. This is a tremendous educational challenge, even among toxicologists. It is difficult to educate the scientists about what a dose response curve is. We have a tremendous challenge with the public because they see things as all or none.

Martin: This tomato grown with the *Bt* characteristic does not require insecticides to control most insects. But, a new protein has been introduced into the tomato. Rosetta Newsome, from a food industry perspective what might be important in terms of information, education, allergen concerns, or other considerations that might be important to share with the public?

Newsome: Well, we would want to share the development of the tomato. Of course, if the tomato looks like a tomato we want to be sure we are actually providing a tomato to consumers. If we are not, we need to let them know. But I think along the lines that you were speaking there are further factors that need to come into play. If this tomato is indeed a tomato, and has similar nutritional qualities to the traditional product, and does not have any known allergens induced, then we want to consider the benefits of consuming the product. We know we need to eat increased amounts of fruits and vegetables to protect our health. And this would provide benefits along that line.

Martin: Let me turn back to Ted McKinney for a minute before we move on to something else. This tomato represents developments in other crops where we may see the *Bt* characteristic to prevent insect damage. It may be in soybeans, corn, cotton or others. Your company, DowElanco, has a long tradition of producing chemicals for insect control. Now, this comes along. How does that affect a company like yours in terms of strategies or planning? Do you feel threatened by it? Are you jumping into the biotechnology business? How are you going to respond?

McKinney: If you look at our traditional product lines, you could say that it represents a threat. But if you are a well-managed company, you are looking at biotechnology as perhaps the next generation of products that would replace traditional chemicals, e.g., fungicides, herbicides, insecticides, etc. And, in fact, that is what we are doing; we are looking at this kind of thing as well. But these are not panaceas. It takes years and years even with the traditional chemistry to develop and receive government approval of new products. It takes about 10 years to register a product, 100-plus tests, and the hurdle rates are enormous. I take comfort in the science that goes into new products. Biotechnology represents new ground and, admittedly, a lot of questions must be answered from a safety and consumer standpoint.

Martin: So you suggest that regulations, although sometimes frustrating, play an important role. They provide assurance that a product is safe to the environment, to consumers, to the producers, and others involved.

McKinney: Yes, I would state very clearly that I think reasonable regulations are an absolute necessity. In fact, Becky, you said that people need to look to FDA because not everyone is going to be as informed or able to get the information at the local shopping store that guarantees how that product is produced. That is why we have regulatory agencies. So, absolutely, we support them.

Martin: OK. Who would like to have my *Bt* tomato? Ted wanted the one produced with pesticides.

Judson: I would like to have it.

Martin: I now want to turn to a less controversial topic. I would like to talk about milk! Lilly, would you comment briefly, from your perspective in the area of philosophy, if you think there are different ethical or philosophical concerns with the application of biotechnology to crops versus animals?

Russow: I think that there are two. Specifically, nobody is worried about how the tomato feels about having various biotechnology products introduced into the plant, or the seed, or whatever, but certainly there are concerns about how the cows fare in terms of their welfare with the growth hormone, bST (bovine somatotropin). And, there is a concern about whether or not it has an impact on the quality of life for cows. Another issue has come up that really doesn't have anything to do with the difference between plants and animals. That concern is with the impact on family dairy farms. I think that is very interesting. It is not just a scientific issue anymore. It has to do with societal concerns in general; what kinds of lifestyles are important and what sorts of lifestyles society wants to protect or enhance.

Martin: If I understood you right, you mentioned at least two things. One is the impact that the technology may have on the animal, itself, and whether it enhances or not the well-being of the animal. Secondly, there may be a concern about the economic, and perhaps social, impacts on farmers, of this technology. You mentioned animal agriculture in your example. What about the issue of manipulating genes, whether they are within different species of plants, within different animals, or maybe transgenic? Does this raise concerns from an ethical point of view?

Russow: I think that that is a very difficult issue, and a very muddled one because we are not very clear on the whole issue of species and species boundaries. Many people have a very strong emotional reaction once you introduce human beings. The introduction of animal genes into human beings, or human genes into animals, I think, worries the general public. There is less public concern about moving genes among plants. I think it is a concern among philosophers, because we don't know what is going on. We don't know whether species ought to be important or not. There are people who worry about playing God and messing up species, but that presupposes something about species being fixed. If you talk to biologists, they tell you the

whole notion of the species is a very confused notion to begin with. It is not a very clear-cut issue at all.

Martin: Let me give you an example of something that happened to me several years ago. A scientist was working with somatotropin to enhance productivity in fish. After a speech, someone in the audience asked this scientist "Where did you get the somatotropin?" He said, "Oh, I had some human growth hormone in the laboratory and I just used that." What do you think about that? How do philosophers deal with that? Is that something that would concern them?

Russow: Personally, I think the question of where the somatotropins came from is not particularly important. On the other hand, some people are worried about the slippery slope; that is, as soon as you start harvesting human products of one sort or another, how far are you going to go? And, you get all sorts of Brave New World concerns with Frankenstein scenarios.

Martin: Like in *Jurassic Park*[7].

Russow: Right.

Martin: I did a little more shopping. I found this milk at a local grocery store. I did some background research on this. This milk came from a dairy farm where there are Holstein cows, so we know the breed. And it is from a herd with a 20,000 pound rolling herd average. It is a well-managed, very productive dairy herd. The dairy farmer keeps good records on the cows. I also note that this is skim milk, and it is not high in butterfat. I am going to pour a glass of milk. So, we know that this milk is homogenized, pasteurized, comes from a well-managed herd, was purchased at a local store this afternoon, and has been refrigerated. Ann Sorensen, would you drink this for me?

Sorensen: No, I am allergic to milk!

Martin: I assume you had an allergic reaction and, after some medical tests, discovered that you had a problem drinking milk.

Sorensen: Yes, I have been allergic since birth.

Martin: So here we have a case where labeling information is important. Do you buy milk in a grocery store?

Sorensen: No, I don't.

Martin: So there are times when consumer information is important. Lilly Russow, would you drink this glass of milk?

Russow: It is probably like the milk that I regularly buy in the grocery store.

Martin: So you have confidence in it based on the information on the label and the fact that there is a regulatory system to control the quality of milk. Rosetta Newsome, would you drink this glass of milk?

Newsome: I definitely would not drink it.

Martin: Why not?

Newsome: Because it has been sitting there for at least a couple of hours. Also, I don't like warm milk.

Martin: So there are many issues that we take into account when considering potential risks. Some are from a health viewpoint. Others may be questions of personal taste and preference. Would anyone else on the panel want my glass of milk?

Judson: I can drink it without any problem.

Martin: I did a little more shopping. I bought some more milk. This milk is a little different. First, let me describe what is the same. This milk also comes from a well-managed dairy farm with a 20,000 pound rolling dairy herd average per cow. Again, it is skim milk. It is cool. It has not been sitting out very long. There is only one additional piece of information that I know about this milk that I didn't about the first milk. It comes from a cow treated with bST. I have another clean glass. I will not ask Ann Sorensen to drink this milk because we already know that she has an allergic reaction to milk in general. Ted McKinney, do you have a concern with drinking this milk?

McKinney: No, I would drink it.

Martin: Why?

McKinney: Well, partly because I have been involved in research and understand the safety hurdles and tests that it takes to demonstrate bST safety. bST is found naturally in cows. I think it comes down to education. I understand the background about bST. I would feel very comfortable drinking that milk.

Martin: Karen Bolluyt, I wish to ask you a question similar to the one that I asked you before. Again, you are writing a story to be released by Iowa State University to appear in the *Des Moines Register.* How would you go about telling the story about the safety of milk, particularly milk that comes from a cow injected with bST?

Bolluyt: I hope my story would abide by two principles. One, that we are a trustworthy source of information. Two, that we respect people's ability to make up their own minds once we give them accurate, factual information.

Martin: David Judson, let me ask you a similar question. You are writing this story for Gannett. The story will be carried across the nation. You want to tell the story about bST being used in milk. How would you approach the story? Where would you seek information?

Judson: I think the points that Karen raised are fundamental. You have to ask the question "Is it safe to drink?" You have to go to sources that are credible. I think that the FDA, or similar sources, are probably regarded by most people as credible. The one thing that I think would be relevant to ask would be: What impact is it going to have on the general economics of the dairy industry? What impact is it going to have on communities that rely upon dairy economics? There may be risk issues, safety issues, and health issues in terms of the family farm.

Martin: OK, so economic issues as well as the science behind bST are important. Now let me change my assumptions just slightly. I am going to come back to both of you with a question. The new information is that FDA approved milk from cows treated with bST as safe about six years ago, but has been analyzing its potential impacts on dairy cows and the environment. The new news story is that bST has just been approved by FDA for commercialization. You must write a story on this news event. Karen, and then David, how would you approach the story of FDA approval of bST for commercial use?

Bolluyt: That is difficult from a university perspective, since it is basically a private-sector story. What we might do is contact our scientists who have expertise in the area and put together a contact list for reporters.

Martin: So you would provide a source of information for reporters who are writing for various national or local newspapers as to where they might go for background information or answers to questions.

Bolluyt: Right.

Martin: **David, how would you approach this bST story?**

Judson: I don't know. There is news value in the symbolic crossing of the regulatory threshold by one company. In other words, is this a harbinger of things to come? I think this would be the dimension of the story that would occur to me most immediately.

Martin: Ann Sorensen, let me turn to you for a moment. I want to bring the farmers into the discussion. FDA has now approved bST for at least one of the companies. You work with farmers. How do you think farmers might respond to this news?

Sorensen: I wish I had the answer to that. I think farmers are split on the issue of bST. I know some dairy farmers who are very concerned about negative consumer reactions. There will probably be some dairy farmers who can incorporate the product immediately into their operations if they feel it is going to increase their efficiency or their productivity. I think there are other dairy farmers who won't touch it. They either will not see a need for it or will be concerned about negative consumer reactions.

Martin: So there may be differences depending on a farmer's operation, economic situation, ability to manage the technology, and how he markets his milk.

Sorensen: Right. They are going to have to manage the new technology. They are going to have to keep track of individual cattle. They are going to have to know what their cows are eating. It is going to require, I think, a high level of management. Not all dairy farmers can do that.

Martin: Rosetta, you work with the food industry and food processors. How would this news event impact some of the people you work with?

Newsome: First, let me clarify that while many of the members of the Institute for Food Technologists are employed in the food industry, others are employed in regulatory agencies and academia. Perhaps, my primary role might be to provide the scientific information for inquiries we get, whether they be from journalists or consumers. If safety concerns remain, then we would strive to provide the background information on the science to satisfy these concerns.

Martin: Rebecca Goldburg, I would like to come back to you for a minute. I know you work closely with some of the environmental organizations. Would

this news about FDA approval of bST raise questions or concerns from an environmental perspective?

Goldburg: I actually have not worked on any issues related to bGH (bovine growth hormone); so my concerns would probably be of a personal nature, and perhaps less about the safety of the milk and more about how we treat animals.

Martin: So you would be more concerned about animal welfare, animal management, or animal well-being.

Goldburg: Right, and also economic issues.

Martin: OK, but what about beneficial or adverse environmental impacts?

Goldburg: Well, there could be some adverse environmental impacts if we lose a lot of dairy farms in the northeast. This raises land management issues. I see it not so much as an environmental issue, but more of an agricultural policy and consumer safety issue.

Martin: Let me turn back to the audience. What we have done tonight, I hope, is give you a flavor of NABC 5. I hope we have set the tone for the conference with two or three examples of some of the kinds of issues of concern to society, to the organizations that we represent including the private sector, to academia, to public interest groups, and to regulatory agencies. Some of the biotechnology examples we discussed this evening are already in place, some are on the near horizon, and others may be further away. Each of you has selected one of four workshops. The four workshops are: public values, public assessment of biotechnology, technical assessment of risks and benefits associated with biotechnology, and, finally, communication about risks. You will have six hours of workshop sessions, tomorrow and on Friday, where you can speak, share your views, raise your questions, express your concerns, or make your recommendations. I hope you do that. I hope you participate. Inclosing, let us take a moment to express our appreciation to our panel members. Thank you very much. I hope this was an enjoyable evening for all of you. Good night. (Applause).