SESSION THREE: Linking the Public and Private Sectors
October 19, 2006 – 3:00 p.m. – 4:45 p.m.
Panelist Mark McLelland

Moderator

John Ruff

Let me introduce our last speaker of the day. Dr. Mark McLellan is the Dean of Research at the University of Florida Institute of Food and Agricultural Science. He's also a former president of the Institute of Food Technologists, with which the World Food Prize is proud to have had a longstanding relation. And, as Ken Quinn said earlier, the first Executive Director of the World Food Prize, Al Clausi, was also president of IFT. And in fact in this particular case, IFT has worked closely with Dr. McLellan in preparing his presentation today on the past, present and future contributions of food science and research to enhancing nutrition and ensuring food security for all. Mark? Thank you.

Can We Do it Again? The Answer is Yes: Targeting Science and Technology to Fight Hunger

Mark McLellan
Dean of Research, University of Florida Institute of Food and Agricultural Science
Former President, Institute of Food Technologists

Thank you, John. Appreciate the welcome.

It is indeed a great pleasure to be here celebrating the 20th anniversary of the World Food Prize. What an extraordinary opportunity to be in conversation, as many have said, talking so often about public-private partnerships and the opportunity to really make a difference.

As John indicated, I'm speaking not only as Dean of Research and Agricultural and Life Sciences but also as a former president of the Institute of Food Technologists. And before I go further, I hope you would join me in recognizing the current president who is here tonight, and that is Denny Heldman. Dr. Heldman, if you could stand. Thank you.

Dr. Heldman presides over one of the largest scientific societies associated with food science; it has 22,000 members. This is an interesting day because throughout today the question

that ultimately is asked is – Can we do it again? Can we make the same dramatic impact? And I guess my answer would be absolutely yes – not necessarily with the same technology, not necessarily with the same approach, but absolutely yes, we can make this kind of dramatic impact.

I flew in two days ago straight from Mexico City. And in Mexico I was up in the city of Saltillo attending the Second World Congress of Food Science and Food Biotechnology in Underdeveloped Countries. Ladies and gentlemen, there were 700 scientists there from 19 underdeveloped countries – extraordinary gathering of scientists. They were all focused on post-harvest, post-farm gate, and adding value and opportunity to moving the food supply from the farm to the consumer in underdeveloped nations. It was the most extraordinary conversations that took place. We covered topics such as new foods and new food ingredients, bioavailability in these foods, new post-harvest techniques and packaging systems and systems for moving products over large distances. Even issues such as intellectual property were being discussed. And it's just incredibly heartening to see that kind of engagement across these 19 countries. "Post-harvest" was the word of the day and the focus of the science, and we were extraordinarily proud to be a part of that.

The Institute of Food Technologists is a scientific society that represents food science and technology. As a discipline, we look at the basic science and engineering of food. We look at the nature of our food and all of the constituents therein. As technologists, we take that basic science and learn to apply it and look at the opportunities to make a difference in the impact of that application.

In essence, our focus is all on conversion, looking at – as the farm gate closes, how do you manage the movement of that product into various food forms that offer choice, offer opportunity, offer stability, offer longevity in the food supply and ability to move it into dramatic and long-range feeding opportunities.

The Institute of Food Technologists is an amazing organization because it partners scientists from industry, government and academia. Founded back in 1939, it is a nonprofit society and today has 22,000 members.

A memorable opportunity I had was attending a news conference with some U.S. senators on Capitol Hill. And we were talking about food science and the opportunity that food science has in making a difference in this world. And they certainly understood the issues of food and feeding the hungry, but they were not aware of IFT. And a senator was standing right beside me, and he said, "Son, can you tell me again what this organization is all about?" And I knew whatever I said in the next two minutes, that gentleman was going to stand up in front of that microphone and all those cameras and say it. So I had to think very quickly as to what to give him. And I said, "Well, Senator, this is a society of 22,000 scientists, and we focus on making sure that we stand for sound science and common sense when it comes to food." And he looked at me, and he said, "Gee, I like that." And didn't he get right up to that camera, and he said those exact same words.

But you know what? It is a very simple way to put it – common sense and sound science when it comes to food. In essence, what we're talking about is finding mechanisms and

increasing our ability to deliver a safe, nutritious, abundant and affordable food supply worldwide. In essence, that is what this discipline is all about.

The Institute of Food Technologists has a dramatic involvement across the globe with many different organizations, some of which are listed here on the slide. And we are in the business, if you would, of making sure that partnerships around the science of the food work very well. We have an extraordinary commitment to the future of food scientists, a commitment that we train today the capable scientists that indeed can ensure that foods of tomorrow will be there and will be there in a quantity, quality, and safety that indeed will supply the needs of the world.

We have an unusual foundation, the president of whom is right here, John Ruff, that has an incredible outreach effort, an educational effort to help folks understand what the science of food is all about. Reaching out to many students in training, this foundation has a dramatic impact in students around the globe.

When asked – exactly how does a food scientist engage with the issue of reducing hunger, it really can be summarized very quickly in this slide. Across these five areas, starting with nutrition, we are the folks that look at the raw materials coming off the farm, that study the methods of preparing, processing, packaging, to ensure that that nutrition is delivered to the consumer, wherever he or she may be, in an optimal quality. We are the scientists that look at the processing systems, the processing systems that reduce loss that can be so devastating, the processing systems that can enhance the safety and the processing systems that ultimately can ensure that product is delivered at great distance to those in need.

We also focus on packaging systems. Pictured here, the traditional can; but far, far beyond the can, there are so many other packaging systems that have had a dramatic impact. And we are constantly looking at unique systems to maximize the opportunity of creating safe food supplies at great opportunities for our consumers.

Safety becomes critical. All one has to do is watch the headlines here in the U.S. and abroad to know that safety is high in the minds of many consumers, certainly in the developing world. But let me assure you in the underdeveloped worlds, the safety of their food supply is indeed critical, too, and they too have great concerns and monitor that closely with their scientists.

The distribution of the foods is also critical and not commonly thought of as a part of the food science realm but indeed a very critical part to ensure that, as that food's delivered, it's delivered in a form that is appreciated.

As a discipline, food science can go back to 1961 when the 1991 World Food Prize Laureate, Dr. Nevin Scrimshaw, established the first Department of Nutrition and Food Science at MIT – 1961. That is not that long ago, not that long ago. We are a very youthful discipline, if you would, and just now engaging in very broad aspects across the food supply. As a discipline, we do focus on the quality of food, on the safety of food, the essential components of food, and look to make sure that we apply all of our science to ensuring a safe product delivery.

The challenges we face read like a chronology of inventiveness. And I say inventiveness because every one of these bullets have had unique technologies, unique science put to them to ensure that we maximize quality from that process – starting at the farm gate with conversion technique. I know that many of us appreciate the raw materials coming off the farm, but most of us would not necessarily take a handful of that and say, "That's good. We're ready to go – that's dinner for tonight." Usually we'd like some sort of processing to be done to make those a little bit more edible, a little bit more enjoyable.

Preserving those foods – to ensure that in the end of the day we are actually delivering a product that has not started to rot and go away. Providing enough food for all people – food security, ensuring that what we produce on the farm is actually converted to usable product and then is sustained and stored and available for use.

Maximizing the nutrition while ensuring the quality is among the top of our goals and of course across all different food supplies, all different food products, ensuring that choice is available as a part of a diet in terms of consumers' needs.

Maximizing our health impact of our foods is critical, and we feel that this has opportunities for the future that we are just now beginning to understand.

If you look at the early interventions that we have used in the food sciences, you can go back 8,000 years, and you start talking about fermentation technologies and the wines and yogurts that back then it was a common technique to do. And it was only in the recent millennia that we saw the science of that being understood and being applied. Drying, salting – very traditional. When you look at the modern technologies listed over on the right of the slide, you start to see an evolution of change with Nicolas Appert having the most dramatic impact on canning when he answered Napoleon's call for an answer of how to protect their food supply.

Louis Pasteur and the pasteurization technique developed in 1862 when he elucidated his thinking on germ theory. And for the first time we started to understand the impact of food processing. Refrigeration – and that's Clarence Birdseye there, having a dramatic impact, certainly in the developing worlds as we saw a great diversity of foods being brought forward.

And then finally a step down, bulk aseptic processing with Phil Nelson and his breakthrough back in the early sixties, dramatically changing the kinds of quality andquantity across these products that can be brought forward.

But yet, ladies and gentlemen, still today we fight with tremendous post-harvest losses. On a good day and a good system, we're getting it down to 20% losses. On a bad day it's far worse, upwards of 50-60% loss. And this post-harvest loss is the focus of the food scientists' approach.

I want to pause for a second and talk about bulk aseptic processing. Because certainly in the modern era, this is one of the more dramatic changes that have had tremendous impact. When you look at bulk aseptics, you're looking at large scale, the capability to produce ultra-large scale quantities of food in a high, high quality, stored for long periods of time and then drawn upon to put into aseptic packaging.

In the 1960 breakthrough of how to manage the science and technology behind bulk aseptics, we had a dramatic impact with that change in technology. And when you look at the impact I'm talking about, take a quick look at these three points:

Total conversion in the U.S. to a bulk aseptic system – although we're not there yet, we are on the way – but that total conversion will result in enough food saved in this process to feed nearly 9 million people annually, extraordinary savings and reduction in post-harvest waste. In two specific food product lines themselves, and that's tomatoes and oranges, we have a 10 percent reduction in spoilage because of the way we're managed through large bulk storage. That produces one million metric tons of new food products each year that would not be available without that technology.

And finally, ultimately to see precisely how it hits all of us – when you see that aseptic package out on the street corner, in the hands of the child or in the supermarket basket, you're looking at, with numbers based on 2003, 1.3 billion liters of product put into an extraordinarily stable system based on bulk aseptics.

As I indicated, I just came from Saltillo, Mexico. I was out in the boroughs there, and as you went down the side streets, you could see the vendors. And what did they have there? They had their aseptic packages of product that was safe and available for people right there, in the poorest region, to still have the product in their hands. And on a similar project outside the boroughs of Jakarta, working with Bogor University, what did you see? The exact same thing – a delivery of safe juice systems, right into the market at a very, very low cost and high, high quality.

Continuing on, as a food scientist, we often focus on many different areas, but it's hard to imagine one not near as important as food safety. Food safety is critical in terms of ensuring that the products that we deliver have a maximum impact in terms of benefit to the consumer.

And finally as we look out into the future, you start to look at foods that have dramatic impact to me personally as a consumer, whether I'm looking at probiotics or customized nutritional designs for my needs. New processing systems – many of them nonthermal – include things such as E-beam, high-pressure processing, pulse electric, and hyper- and hypobaric storage.

Unique packaging systems become far more proactive in terms of their proactive ability to enhance and maintain storage of products. On-farm harvesting and processing to cut down further the waste right on the farm lead to unique advances in the future, too. And on and on we go. This list could be a couple of screens long, but these are just a couple of the leading edges.

Finally, to talk about some of the partnerships we work on with others involved in the food system. Start with talking about genomics, the impact of individualized nutrition and the challenges in the food science field to find systems of foods that deliver those customized nutritional needs. Nutragenomics where we're looking at diet regulation or diet-regulated genes and therefore the impact on that in terms of nutritional interventions.

Metabolomics where you start to look at very fundamental cellular systems, of absorption of nutrients and things of this sort. And proteomics – the way you actually impact the tremendous production of protein systems inside the body. And then finally listed there, a unique area of growth in terms of nanotechnology applications in the packaging field.

As food scientists, and as a former president of the Institute of Food Technologists, we could not be happier to be here and to help you celebrate the 20th anniversary of the World Food Prize. Thank you very much.

John Ruff

Thanks, Mark. Your optimism is infectious. I feel a lot better now that we can repeat the Borlaug miracle.