# The AMSA Symposium on Microbiological Testing

**Chris R. Calkins and Mohammad Koohmaraie**

At the Reciprocal Meat Conference in Storrs, Connecticut in 1998, a decision was made by the Board of Directors of the American Meat Science Association to sponsor a symposium on microbiological testing in beef. There were many reasons for this decision. Dell Allen, the President who completed his term at that meeting, had continually reminded the Board of the need for science to be heard. There was also an exceptionally well attended reciprocation session that year entitled "Standardized Sampling and Testing Procedures for *E. coli* O157:H7 in Fresh and Frozen Beef Raw Materials," presented by James Marsden. In response to USDA directive 10,010.1, the industry had undertaken an initiative to develop a standardized sampling and testing program for *E. coli* O157:H7 which would be statistically equivalent to existing program. One outcome of that session was a clear need on the part of science to speak up about the appropriateness of microbiological testing – if and how it should be done.

In the discussion at the RMC sparked by these and other events, several people offered suggestions as to how such a symposium might be conducted. Among others, suggestions were made by Russell Cross, Dell Allen, Mohammad Koohmaraie, and Chris Calkins. Many other conversations and opinions were offered. The result was a charge from the Board to Mohammad Koohmaraie and Chris Calkins on July 15 to form a "Pathogen Sampling Task Force for Meat Food Safety Programs" with the following tasks:

1. To assess current pathogen sampling plans used by USDA-FSIS and the meat industry with a determination of the adequacy or inadequacy of these plans;
2. To identify microbiological sampling criteria and testing methodologies that are sufficient to reduce the incidence of pathogens on meat products to a safe level;
3. To develop unbiased sampling recommendations based on the best science available for individual product categories that would be suitable for use industry-wide; and
4. To compile a set of consensus documents into an AMSA proceedings that would provide the best scientific sampling advice available (based on current knowledge) for reducing the incidence of pathogenic microorganisms on meat products.

We were further charged to complete the project and provide the consensus document by September 30, 1998 or as soon as feasible – quite a daunting task.

Like many important tasks, it was crucial that we enlist the input of many people. An ad-hoc committee was formed to react to ideas and provide input into the nature of the meeting. We invited input from a variety of sources, including the AMSA Public Issues Committee, who had been asked to prepare such a document earlier and had concluded that the issue was much larger than their committee could address. Others who provided specific input during the organizing conference call are identified in Table 1.

**TABLE 1.** Ad-Hoc Committee Members on the Structure and Strategy of the Microbiological Testing Symposium.

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| Jim Dickson, Iowa State University |
| Gary Acuff, Texas A&M University |
| H. Russell Cross, IDEXX Food Safety Net |
| Jim Claus, Virginia Polytechnic and State University |
| Larry Borchert, Food Industry Consultant |

Throughout the process, there were several points of agreement relative to strategy. We wanted to have the best microbiological and food safety experts available. Representation was sought from government, industry, and academic experts around the world. Although sponsorship was initially sought, very little was obtained. Thus, this was substantially an effort by the American Meat Science Association.

It quickly became clear that there were several issues of contention. Some felt that we should make specific recommendations for microbiological sampling procedures, as per the initial charge. Others felt just as strongly that microbiological testing itself as a means to assure food safety was not

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*Reciprocal Meat Conference Proceedings, Volume 52, 1999.*

scientifically defensible and making procedural recommendations would be counter to science. Clearly, some middle ground was sought. It was ultimately decided to let the experts make the decision as to how far the symposium would go. In retrospect, this may have been a mistake. Some participants of the conference came with their own agenda concerning a protocol for recommendation. Others were not comfortable with such an approach and expended much of their effort in explaining why microbiological testing was unsound. The result, as will be discussed, was an inability among the experts to agree on specific recommendations concerning actual testing protocols.

The timeline we were initially given turned out to be unrealistic. Identification and invitation of the experts took longer and several other microbiological testing/sampling conferences were scheduled during the fall. The decision was made to slow the process in the expectation of a better outcome by getting the essential experts to the meeting. A preliminary date in December was ultimately rejected for January, 1999. This was fortuitous because USDA announced the "clarification" of their *E. coli* O157:H7 adulteration policy to include all non-intact beef just 5 days before the symposium. Despite the monumental impact that such a decision had on the industry, a conscious effort was made to avoid making the issue the sole focus of the symposium. For the most part, the participants understood and accepted the notion that ours was a broader issue.

The participant list was prepared with input from those who helped structure the symposium. The experts included those in the industry who deal with microbiological testing on a daily basis. Representatives from testing laboratories, packing plants, quick service restaurants, and meat processing were invited, as were a number of experts from the USDA and FDA. Unfortunately, no FSIS or FDA employees participated in the symposium, despite specific letters of invitation, an entreaty to Thomas Billy, USDA-FSIS administrator, and numerous phone calls. A few academic scientists were included, although they made up less than 20% of the group. International representatives came from New Zealand, Australia, Canada, and the United Kingdom – Representatives from other others countries were invited but unable to participate. In short, a considerable effort was made to bring together the right people with the technical knowledge to accomplish the task.

The format for the symposium was designed to provide two overarching, thought-provoking concept papers at the beginning of the symposium. The first paper addressed appropriate and inappropriate uses of microbiological testing. The second paper dealt with statistical evaluation of sampling protocols. These were followed by five issue papers, designed to address microbiological testing at various phases of the production/processing chain: sanitation, harvest/carcass, fabrication/trim, and ground beef operations. An additional issue paper dealt specifically with *E. coli* O157:H7. The titles and speakers for the symposium are included in Table 2.

**TABLE 2.** The Role of Microbiological Testing in Beef Food Safety Programs.

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| Appropriate and Inappropriate Uses of Microbiological Testing | Russ Flowers, Silliker Labs |
| Statistical Evaluation of Microbiological Sampling Plans | George Milliken, Kansas State University |
| Sanitation | Julie Lahr, Excel Corporation |
| Harvest-Carcass Sampling | Colin Gill, Agriculture & Agri-Food Canada |
| Fabrication/Trim | Greg Siragusa, USDA, ARS |
| Ground Beef | Gary Acuff, Texas A&M University |
| *E. coli* O157:H7 | Bruce Tompkin, Armour Swift/Eckrich |

The format for the symposium was prepared and distributed to a number of industry groups, seeking their comments prior to the meeting. It was felt that this was an important way for those who were not invited to suggest topics of concern or importance. One written comment was received and it was shared with the participants to reduce errors in interpretation. Oral comments were addressed by oral instruction to the group.

Following the issue presentations, the participants were divided into four break-out groups: sanitation, pre-harvest/carcass, trim, and ground beef operations. Each group was asked to address the following questions:

1. Is there currently a valid sampling protocol?
2. What are the appropriate criteria to establish and evaluate a sampling protocol?
3. What information is needed to develop a valid sampling protocol?
4. Should the sampling protocol be different for each pathogen? If so, how?

These questions were provided to the group leaders in advance of the symposium so that participants would have them in advance in order to provide quality input. A list of the group leaders and recorders is presented in Table 3. We truly appreciate their time and effort. This was not an easy assignment.

**TABLE 3.** Group leaders and recorders at the Microbiological Sampling Symposium

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| **Sanitation** | |
| Leader - Larry Borchert, Food Industry Consultant | |
| Recorder - Jennifer Johnson, Deibel Laboratories, Inc. | |
| **Harvest/Carcass** | |
| Leader - H. Russell Cross, IDEXX Food Safety Net | |
| Recorder - John Sofos, Colorado State University | |
| **Fabrication/Trim** | |
| Leader - Curtis Kastner, Kansas State University | |
| Recorder - Jimmy Keeton, Texas A&M University | |
| **Ground Beef** | |
| Leader - James "Bo" Reagan, National Cattlemen's Beef Association | |
| Recorder - Mark Anderson, Foodmaker, Inc. | |

After meeting for approximately 4 hours, the symposium was reassembled to hear preliminary reports from each of the groups. This was to ensure that all of the participants understood what the other groups were doing. Groups were then given additional time to continue to address and refine their reports.

The following morning, each breakout group reported back to the entire symposium. It's fair to say that some groups met with considerable disagreement from the rest of the participants while others failed to elicit much discussion. Because it was clear that the symposium would not reach consensus in this fashion, an attempt was made to identify the consensus points that all could support. The ensuing discussion represented excellent input by all of the areas represented at the symposium.

There was complete agreement on the following points:

1. The main purpose of microbiological testing of foods is to validate and verify process control measures in the context of a properly implemented HACCP system (referencing the Codex Alimentarius Commission.)
2. Effective microbiological testing programs are based on sound Food Safety Objectives with definable microbiological performance criteria.
3. Pathogen testing at any stage will not assure food safety.
4. Foodborne pathogens will not be detected consistently when they are non-randomly distributed and/or occur at a low incidence.
5. Pathogens or other microorganisms at a low incidence cannot be used to assess process control.
6. Testing for appropriate non-pathogenic organisms will allow validation and verification of process control systems designed to improve food safety.
7. Declaration of a foodborne pathogen as an adulterant in raw products (e.g., *E. coli* O157:H7 in beef) ...
   - discourages testing for that pathogen,
   - leads to a false sense of security among consumers
   - discourages evaluation of potential control measures
   - encourages the inappropriate use of microbiological testing.
8. Microbiological testing of foods in production in important, but is only part of the overall strategy for controlling food safety. Education concerning proper handing and cooking is essential.

At the conclusion of this extraordinary session, the participants were silent when asked if anyone disagreed with these consensus points. The organizers came away with the strong conviction that the entire symposium did not necessarily endorse the reports of the breakout groups but that the consensus points above were unanimously approved.

After the symposium, a writing committee of representatives from industry and academia prepared a consensus document built around the eight consensus points described above. The AMSA Board of Directors took on the task of developing the written report. Once a report was available, a preliminary copy was sent to each of the participants for comment. Not surprisingly, certain segments of the industry were unhappy with what was perceived as an implication that there was no value in testing for pathogens. From our perspective, the report does not make that statement. There may well be other reasons to conduct pathogen testing – including the possibility of detecting spikes in production prior to distribution. However, this point was not identified in the final consensus building session by the participants of the symposium.

The results of this symposium were presented in two key places. About 3 weeks after the meeting, Chris Calkins presented the consensus points to the Western Science Update Conference at the National Meat Association meeting. Two weeks later, President Jimmy Keeton presented them at the public hearing held by USDA-FSIS concerning their clarifying policy on *E. coli* O157:H7 in non-intact beef. The proceedings have since been released and are available from the AMSA office.

All AMSA programs should undergo some form of evaluation and there are several aspects of this effort that should be acknowledged. The AMSA definitely had an impact on industry and government conversations on the issue. The program elevated, at least for a time, the visibility of AMSA to the industry, government, and around the world. Gathering experts for articulation of an opinion concerning the science of microbiological testing is certainly consistent with our mission. It's refreshing to see AMSA take such a leadership role. There are, however, some aspects that need to be strengthened as we continue to do similar programs. Effort should be expended to build closer working relationships with our sister organizations in the industry. During the development and delivery of this program, circumstances and events occurred to suggest that stronger ties are needed. We (AMSA) can be fairly criticized for the time delay in publishing the proceedings. Although efforts were made to get the message out, the written documents held time-sensitive information that could have been better used had they been available sooner. These observations are not meant as criticisms, rather they are suggestions for ways that AMSA can improve, learn from our experiences, and become an even stronger advocate for science in the meat industry.