

An Update of the American Meat Institute Foundation's Food Safety Initiative Research

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Background

The American Meat Institute Foundation (AMIF) is a non-profit research, education and information foundation established by the American Meat Institute to seek solutions to the challenges of producing safer meat and poultry products that meet consumers' expectations.

In forming the Foundation in 1992, American Meat Institute (AMI) took a page from its own history book. In 1944, the Institute established the first AMI Foundation, complete with a full commercial laboratory, in Chicago, Illinois. From 1944 until the late 1970s, the Foundation conducted millions of dollars worth of research on meat processing, safety and nutrition for the industry. Although the new AMI Foundation does not house a laboratory, it does solicit and distribute research grants to universities, public opinion pollsters, non-profit organizations and other foundations to conduct research on behalf of the industry.

In 1999, AMIF launched a multi-million dollar, multi-year Food Safety Initiative with the goal of reducing *Listeria monocytogenes* (*L.m.*) and *E. coli* O157:H7 from meat and poultry products. The AMI Board of Directors voiced its support for the new Foundation agenda by voting for a special dues assessment on AMI members in 1999 and 2000. To date, more than \$3.6 million has been raised by more than 120 member companies, non-member companies and other industry groups, to fund the research programs.

AMIF research priorities are geared toward applied research that will help identify and validate technologies and methods that can provide industry partners with processing options and solutions to their most difficult food safety challenges. AMIF strives to coordinate projects with government, academic and other industry funding agencies to ensure that research dollars can be leveraged where appropriate and the efforts are not duplicated. AMIF seeks to maintain a transparent process

whereby the entire industry can benefit from the findings of the funded projects. Results from AMIF funded research projects are made available to the industry at large through various public forums as well as the posting of status reports and final reports on the AMIF web site (www.amif.org). In addition, the research activities of AMIF allow the industry to have a voice in the research process of other industry groups and federal agencies.

The AMIF Funding Cycle

Two AMIF research committees determine research priorities and suggestions for funding. These committees are made up primarily of scientific and technical representatives from companies who have contributed to AMIF. The committees also have participation from government and university researchers. The final decision to fund a project is made by the AMIF Board of Directors.

Each year AMIF solicits pre-proposals that are designed to address the stated research priorities. During the spring, AMIF research committees identify knowledge gaps and industry research needs that provide the basis for development of specific research priorities. Based on the committees' research priorities, AMIF staff creates and solicits a request for pre-proposals (RFP). The RFP is distributed to the food safety research community and other interested parties. The RFP is developed and prioritized to address specific research areas that are deemed to be important to a majority of industry.

Pre-proposals are due about 45 days after initial solicitation. After the closure of the RFP period, pre-proposals are reviewed by the AMIF research committees and are either recommended or not recommended for full development. Based on the research committees' review and recommendations, the AMIF Board of Directors has the opportunity to approve the selected pre-proposals for full development in October. The principle investigators of approved pre-proposals are given about 45 days to provide a complete description of the proposed research including project justification, experimental design, methodology and budget. Full proposals are reviewed by the research committee, and based on that review, the proposals with the greatest merit will be recommended for funding.

In January, the AMIF Board of Directors meets to discuss the recommended research and approve the research proposals deemed appropriate for the industry. The grant recipients are then notified and contract negotiations begin. The AMIF

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Food Safety Initiative is a competitive grants program. Over the past two years, AMIF has awarded six grants for research on fresh meat pathogen research, which represents 10 percent of proposals submitted; and 14 grants for research on ready-to-eat meat pathogen research, which represents 20 percent of proposals submitted.

Principle investigators are requested to provide informal updates of their research twice a year (in the spring and fall). These updates are incorporated into AMIF Research Project Status Reports that are distributed to the AMI Board of Directors at their spring and fall meetings. Subsequently, these status reports are posted on the AMIF web site at (www.amif.org). When research is completed, all final reports are posted on the AMIF web site and made available to the general public. AMIF encourages the publication of research findings in appropriate, peer reviewed scientific publications.

Completed Projects to Date

Some projects from the initial funding cycle have been completed. The following is a brief listing of those projects and the institutions that conducted the work.

Fresh Meat Research (focus is *Escherichia coli* O157:H7)

- Optimal methods to test for the presence of *E. coli* O157:H7 and *Salmonella* spp. on the hides, carcasses and feces of cattle. K.E. Belk, principle investigator, Colorado State University.
- A comprehensive literature review on preharvest interventions to reduce the prevalence of *E. coli* in cattle. K.E. Belk, principle investigator, Colorado State University.
- Survey of 12 slaughter facilities to validate the feasibility of testing carcasses as an alternative to testing ground beef in production and distribution channels. Study design and collection by AMIF and data analysis conducted by G. Smith, Colorado State University.

Ready-to-Eat Meat Research (focus is *Listeria monocytogenes*)

- A comprehensive literature review of intervention technologies. E. Doyle, principal investigator, University of Wisconsin, Food Research Institute.
- A survey of perishable product temperatures at retail, in transit to consumers' homes and in consumers' refrigerators to document temperature fluctuations. R. Daniels, principal investigator, Audits International.
- Validation of compositing samples of ready-to-eat products into larger units for laboratory analysis as a means of reducing analytical cost and time. M. Curalie, principal investigator, Silliker Laboratories.
- A Survey of Consumer Handling of Ready-to-Eat Meat Products. F. Kleinburd, principal investigator, Wirthlin Worldwide.

The completion of these important projects have provided the industry with valuable resources and have acted as a catalyst for future AMIF funding and research.

Ongoing Research

Since AMIF's most recent inception, there have been four funding cycles, three of which have been completed. A majority of research funded in the first three cycles is expected to be complete in 2001. Examples of current research on *Listeria monocytogenes* are: reducing biofilm formation in meat processing facilities; ingredient and additive technology, such as rosmarinic acids, CPC, pediocin and protamine; optimal radiation dose and pathogen survival after irradiation processing; competitive exclusion organisms; and a literature review on the survival of foodborne pathogens during cooling of heat treated and thawing of frozen meat and poultry products.

Examples of ongoing projects on fresh meat pathogen research focused on *E. coli* O157:H7 are: the addition of probiotic bacteria to cattle feed to determine its effect on eliminating O157:H7; a bacteriophage treatment system to prevent or modulate *E. coli* infections in cattle; and the distribution of virulent and avirulent subclones of O157:H7 in the United States.

Current Research Priorities

There is currently an open funding cycle, with pre-proposals due August 24, 2001. The following is a specific listing of the 2001 research priorities.

Controlling *Listeria monocytogenes* (*Lm*) on ready-to-eat (RTE) meat and poultry products

Innovative pathogen intervention technologies

- Identification of bactericidal and/or bacteriostatic ingredients or treatments.
- Post-packaging treatments of RTE meat and poultry products such as irradiation, ultra-high pressure, and re-thermalization. The projects should address:
 - Microbial inactivation and microbial tailing effect;
 - Effects of source and dose or level of treatment on organoleptic properties;
 - Effects of product and/or environmental temperature on process effectiveness; and
 - Effects on package and product integrity.
- Investigation of the extent and nature of *Lm* inactivation and survival in RTE meat and poultry products after application of bactericidal interventions.

Operational control and monitoring of the processing environment

- Investigation of the role of aerosols in transport of *Lm*.
- Methods of preventing microbiological recontamination of sliced meats.
- Validation and development of clean room technology.
- Practical protocols to validate cleaning procedures.
- Validation of environmental sampling plans.
- Identification of non-pathogenic surrogate organisms for ongoing process validation.
- Real-time sampling methodologies / technologies.
- Evaluation of process control tools, such as biosensors. Proposals on testing methodologies should be based on real-time or near real-time results.

Information to enhance current and future Listeria risk assessments

- Develop data to address “information gaps” and data needs identified in the current FDA/USDA Draft Risk Assessment for *Lm*.
- Refinement of data on human infectious dose from *Lm* in the FDA/USDA Draft Risk Assessment.
- Comparison of illness rates from listeriosis among developed countries with special emphasis on the regulations in force in those countries.

Controlling Escherichia coli O157:H7 in Fresh Beef Products

Pre-harvest research

- Investigate the potential for on-farm management practices as microbial interventions.
- Determination of the mechanism for intestinal colonization of *E. coli* O157:H7 and opportunities for control.
- Develop greater understanding of the ecology/epidemiology of *E. coli* O157:H7 from the feedlot/farm to the packing plant.
- Evaluation of novel feed and/or water additives or treatments.
- Evaluation of the opportunities for cattle vaccination against *E. coli* O157:H7.
- Effects of animal health and stress status on *E. coli* O157:H7 prevalence and shedding.
- Effects of time-on-feed and feed withdrawal schemes on *E. coli* O157:H7 prevalence and shedding.
- Effect of seasons and regions on the prevalence of *E. coli* O157:H7 in live cattle.

- Effects of contamination and opportunities for control at the feedlot and during transport.

Post-harvest research

- Investigation of novel intervention technologies for *E. coli* O157:H7.
- Validation of existing intervention technologies for *E. coli* O157:H7.
- Development of non-pathogenic surrogate organisms to be used in process control or as a means to validate intervention technologies.

Information to enhance current and future E. coli O157:H7 risk assessments

- Data needs identified in the current FSIS Draft Risk Assessment for *Escherichia coli* O157:H7.
- Developing data that may be used in future pathogen risk assessments.

Other

- Evaluation and understanding of the potential microbial risks associated with abscesses in fresh meat products.

Summary

The AMI Foundation will continue to strive to be at the forefront of applied food safety research with a focus on solutions for current and future challenges. AMIF plans to do this through continued funding of research that is both relevant and applicable to the processes within our industry. We also will continue to educate consumers, government and industry concerning the food safety challenges we face and the