



Public Meeting for AFRI Stakeholders
Docket Number NIFA-2012-0004
“Solicitation of Input From Stakeholders Regarding the Agriculture and Food Research Initiative”

Verbal Comments Submitted by the American Meat Institute Foundation

February 22, 2012

Good morning. My name is Betsy Booren and I am the Director of Scientific Affairs for the American Meat Institute Foundation.

The AMI Foundation appreciates the opportunity to give stakeholder input to the AFRI program.

The AMI Foundation (AMIF) is a non-profit research, education and information foundation established by American Meat Institute in 1944. AMI was founded in 1906 and is the nation's oldest and largest meat packing and processing industry trade association. AMI's members slaughter and process more than 90 percent of the nation's beef, pork, lamb, veal and nearly 75 percent of the turkey produced in the United States. AMI believes science is the backbone for improving food safety within the meat and poultry industry and has invested that belief in its Foundation.

AMIF strives to investigate ways the meat and poultry industry can produce better, safer products for consumers. AMIF actively works with the meat and poultry industry, universities, government agencies, private institutions, non-profit organizations and other foundations to conduct research, not only in food safety, but also in areas of worker safety, nutrition and consumer information projects.

Since 1999, the AMIF research program has directly sponsored nearly 100 food safety research projects at leading universities and research labs, totaling over \$8,000,000. Those projects have helped develop new technologies to reduce microbial hazards, improve the safety of retail delis, gain a better understanding of the taxonomy of microorganisms to select or create intervention antimicrobials, and maintain the highest level of employee training through continued education programs.

AMIF's food safety program has set a clear goal to reduce and ultimately eliminate Shiga toxin-producing *Escherichia coli* in fresh beef, *Listeria monocytogenes* in ready-to-eat meat and poultry products; and *Salmonella* in meat and poultry products. AMIF's 2011-2012 research priorities will be submitted to the record as well as the 2012-2013 once finalized.

That being said, AMIF also recommends the following for consideration during the development of the 2013 AFRI competitive grants program.

1. In the area of food safety, AMIF encourages continuous support and long-term funding, especially as the meat and poultry industry faces significant food safety challenges. The meat and poultry industry uses preventive food safety process management systems that rely on the monitoring of parameters to ensure the system is in control. One tool

commonly utilized is microbial tests. The results help companies make real-time decision about the products they are producing.

There is an immediate and critical need to develop and evaluate real-time or near real-time microbial sampling and testing technologies. Accurate and precise technologies are needed to deliver results so business continuity is maintained. Why is continuity so important? It allows for rapid decisions to be made during production that ultimately ensure that the safest product is produced.

This type of basic research is discovery research; hopefully the research that drives innovation. This type of research is extremely time-consuming and expensive, which makes it difficult for organizations like our Foundation to fund, but ideal for NIFA and AFRI. AMIF supports the development of such a program, specifically for STEC, *Listeria* spp., and *Salmonella*, as well as emerging pathogens.

2. AMIF believes a greater understanding of human salmonellosis is needed. Illnesses attributed to *Salmonella* have remained virtually stagnant since 1996 and have increased 24% since 2000. This is even more disturbing as the scientific regulatory data for the meat and poultry indicate decreases in *Salmonella* prevalence.

AFRI should develop a program that examines the human acquisition factors of *Salmonella* and examine the causative species that cause illness, if causative species are commodity specific, how to better attribute *Salmonella* to specific food illnesses, address what is the role of competitive exclusion in preventing illness, among others.

3. AMIF strongly encourages NIFA and the AFRI program to reexamine foodborne illnesses, outbreaks, prevalence, and other public health data used to determine funding priority areas that will reduce the public health risk of consuming certain foods and attribute the illnesses more rapidly. The AFRI program should target these areas, the areas of greatest societal impact, for the development of future RFAs. For instance, the foodborne illnesses associated with *Salmonella* have remained virtually unchanged despite decreases of prevalence in meat and poultry products. Research should be focused to improve the health of Americans.

The following recommendations highlight the fundamental and critical importance of better understanding how the ecology, epidemiology, and taxonomy of microorganisms is needed to solve practical food safety issues facing the meat and poultry industry. AMIF supports the approach of solving food safety concerns throughout the entire food production continuum.

- In the area of controlling Shiga toxin-producing *E. coli* (STEC) in fresh beef products, the following research is needed:
 - Practical intervention technologies to reduce levels of STEC at lairage.
 - Determine the mechanism for intestinal colonization of STEC and corresponding opportunities for control.
 - Evaluate the statistical validity of existing and alternative sampling methods for STEC in beef trim and finished products.
 - Identify and validate novel intervention technologies for STEC.
 - Develop and evaluate real-time or near real-time STEC sampling and testing technologies.
 - Develop data to support future risk assessments of STEC and to estimate the human health risk attributable to beef products.

- In the area of controlling *Listeria monocytogenes* on ready-to-eat meat and poultry products, following are selected issue areas that deserve consideration for future funding as knowledge gaps exist:
 - Develop and/or identify and validate bactericidal and/or bacteriostatic ingredients or treatments.
 - Identify factors involved in regulation of genes that influence the organism's ability to thrive in RTE processing environments, on food contact surfaces and/or on products. Identify potential synergistic effects of existing hurdles related to gene expression and evaluation of differences among serotypes and impact of meat species type.
 - Develop and evaluate real-time or near real-time *Listeria* sampling and testing technologies
 - Develop improved and validated quantitative methods for *Listeria monocytogenes* detection in foods and environmental samples.
 - Improve and augment epidemiological data on food attribution for listeriosis, both sporadic and outbreak cases.

- In the area of controlling *Salmonella* in meat and poultry products, the following research is needed:
 - Develop data to support future risk assessments of *Salmonella* and to estimate the human health risk attributable to beef, pork and/or poultry products.
 - Identify likely sources of contamination, risk factors, and how to systematically intervene at the production facility, during transportation and lairage, and the levels of *Salmonella* present on carcasses and meat products.
 - Develop and determine the effectiveness of existing or new intervention technologies on multiple serovars of *Salmonella* including those that are multi-drug resistant.
 - Identify the potential for *Salmonella* harbors within the post-harvest processing environment and interventions to reduce or eliminate the presence of *Salmonella* in the identified harbors.
 - Develop cost-effective quantitative sampling and analytical methods for *Salmonella* on raw meat and poultry products that will provide meaningful data for enhancing public health.
 - Investigate the epidemiology of multi-drug resistant *Salmonella* within the production chain and quantify the human health risks associated with these organisms.

- In keeping with the principle of developing education programs, AMIF strongly supports the funding of extension components within the AFRI program. Communicating the results of food and agricultural research is essential in improving the food safety, nutritional knowledge, and general knowledge of food science to Americans.

On behalf of the American Meat Institute Foundation and the AMI members that support it, I thank you for allowing me the opportunity to comment. AMIF looks forward to working with NIFA and within the AFRI program to solve these challenges.

Controlling Shiga Toxin-Producing *Escherichia coli* in Fresh Beef Products

Priority Focus

Determine the most effective location(s) in the production chain for ground beef to apply interventions to maximize reduction of microbial contamination. Please consider the following questions:

- Does the application of pre-harvest interventions in a food safety system reduce Shiga toxin-producing *E. coli* (STEC) (O157:H7, O26, O103, O111, O121, O45, and O145) contamination in ground beef products?
- Does the application of carcass washes and/or other post-harvest interventions in a food safety system reduce STEC contamination in ground beef products?

Pre-Harvest Research (Pre-harvest is defined as the time period prior to cattle being slaughtered.)

- Lairage has been identified as a risk factor for *E. coli* O157:H7 contamination of hides for cattle delivered to processing plants. Proposals should identify practical intervention technologies to reduce levels of *E. coli* O157:H7 at lairage.
- Develop easy to adopt hide treatment technology to reduce *E. coli* O157:H7 load on cattle presented for harvest.
- Develop greater understanding of the ecology/epidemiology of Shiga toxin-producing *E. coli* (STEC) (O157:H7, O26, O103, O111, O121, O45, and O145).
- Determine the mechanism for intestinal colonization of STEC and corresponding opportunities for control.
- Determine the most effective location(s) in the production chain for ground beef to apply interventions to maximize reduction of microbial contamination? (see **Priority Focus** for additional detail).

Post-Harvest Research (Post-harvest is defined as the time period following cattle being slaughtered.)

- Determine the most effective location(s) in the production chain for ground beef to apply interventions to maximize reduction of microbial contamination? (see **Priority Focus** for additional detail).
- Identify and validate novel intervention technologies for STECs.
- Evaluate the effect of the plant environment (*e.g.* air, machinery, employees) in the role of transmission of *E. coli* O157:H7.
- Determine a novel method of reducing transfer of *E. coli* O157:H7 from the hide to the carcass.
- Evaluate the statistical validity of existing and alternative sampling methods for *E. coli* O157:H7 in beef trim and finished products.
- Identify and validate novel intervention technologies for *E. coli* O157:H7 in trim. The proposal should address the impact of the intervention on the organoleptic properties and shelf-life.
- Validate existing and commonly used intervention technologies for STECs.
- Develop a standard protocol for validating finished product sampling, specifically in ground beef.

Post-Harvest Research (Post-harvest is defined as the time period following cattle being slaughtered.) continued

- Examine the D-values for microorganisms in irradiated products. Are there differences between O157:H7 and non-O157:H7 STECs (O26, O103, O111, O121, O45, and O145) and/or gram-positive and negative microorganism?
- Is STEC contamination on blade tenderized and/or enhanced whole muscle beef products a potential public health concern? Enhanced whole muscle beef products include any product that is marinated and/or have some added aqueous solution that is distributed to the internal core of the whole muscle through injection, tumbling, *etc.*
 - Will common microbial interventions reduce potential contamination?
 - Translocation and Risk. Research should include more realistic inoculation levels (*e.g.* 10^4) to mimic potential in-plant contamination scenarios. Proposals also should address application of common commercial interventions to demonstrate the efficacy of treatments in minimizing the translocation of microbial contamination.
 - Survival during Cooking. Research should include direct internal inoculation of whole muscle products mimicking needle/mechanical tenderization. The inoculation levels should range from low levels (10^2) to higher levels (10^4) which more accurately reflect potential contamination in commercial settings. The proposal should address any protective effects an enhancement solution may have on microbial survival during cooking. Proposed research should also demonstrate lethality during common cooking practices.
- Compare the application of antimicrobials using traditional spray methods and application via electrostatic spray. The proposal should address the efficacy of the treatments, application levels and any potential waste/loss of antimicrobial solutions based on the type of application.

Information to Enhance Current and Future STEC Risk Assessments

- Address data needs identified in the FSIS Draft Risk Assessment for *E. coli* O157:H7.
- Conduct an analysis of the combination of virulence factors required to cause human illness.
- Develop data to support future risk assessments of *E. coli* O157:H7 and non-O157 shiga toxin-producing *E. coli* (O26, O103, O111, O121, O45, and O145) and to estimate the human health risk attributable to beef products.

Controlling *Listeria monocytogenes* on Ready-to-Eat Meat and Poultry Products

Priority Focus

Improve and augment epidemiological data on food attribution for listeriosis, both sporadic and outbreak cases. The proposal should recognize the following assumptions:

- The Food and Drug Administration/Food Safety and Inspection Service *Listeria* Risk Assessment indicate ready-to-eat deli items are responsible for a majority of foodborne listeriosis cases in the U.S.
- USDA's Food Safety and Inspection Service (FSIS) data indicate the prevalence of *Listeria monocytogenes* (*Lm*) on RTE meat and poultry products has been declining from 2.54% contamination rate in 1998 to 0.45% in 2008, while the Centers for Disease Control and Prevention (CDC) 2009 FoodNet data indicate listeriosis cases only declined from 5 cases/million in 1996 to 3.4 cases/million in 2009. If a majority of the listeriosis cases are indeed caused by contaminated deli meats, a much more considerable decline of human listeriosis cases should have occurred over the last 10 years. Research is thus needed to understand the reason behind this apparent discrepancy between the risk assessment data and the FSIS and CDC data on food contamination with *Lm* and human listeriosis cases in order to facilitate further targeted interventions to reduce human listeriosis cases.
- Identify data gaps in the attribution of listeriosis cases related to distribution, retail and consumption of deli sliced meats, specifically meats sliced in retail delis.
- Identify and examine potential transmission and/or contamination vectors in a retail deli environment, including personnel and non-meat RTE deli products.
- Identify interventions to reduce the transmission and/or cross-contamination of *Lm* in the retail deli environment.

Develop a White Paper addressing the scientific support behind current process controls employed by the ready-to-eat (RTE) meat and poultry industry. This paper should:

- outline the "seek and destroy" philosophy;
- provide background on the development of the "seek and destroy" philosophy including scientific support; and
- examine the regulatory policy for all RTE foods and detail the positive and negative aspects of each federal agency's approach.

Innovative Pathogen Intervention Technologies

- Identify and validate bactericidal and/or bacteriostatic ingredients or treatments. Proposals should address existing FSIS and FDA regulations (*e.g.* FSIS Supplementary Guidance - http://www.fsis.usda.gov/OPPDE/rdad/FRPubs/97-013F/Lm_Supplementary_Guidance.pdf, FDA approval status). Additionally, proposals should define the meaning of bacteriostatic and bactericidal in the context of existing regulations. Proposals should include an evaluation of the impact on sensory attributes, cost and application method.
- Identify factors involved in regulation of genes that influence the organism's ability to thrive in RTE processing environments, on food contact surfaces and/or on products. Identify potential synergistic effects of existing hurdles related to gene expression. Proposals should include an evaluation of differences among serotypes and impact of meat species type.
- Validate existing and commonly used intervention technologies for *Lm* and how they impact *Salmonella* survival in fully cooked RTE meat and poultry products. The proposal should address additives and ingredients; and thermal processes.

Innovative Pathogen Intervention Technologies continued

- Compare the application of antimicrobials using traditional spray methods and application via electrostatic spray. The proposal should address the efficacy of the treatments, application levels and any potential waste/loss of antimicrobial solutions based on the type of application.

Operational Control and Monitoring of the Processing Environment

- Identify methods of preventing microbiological recontamination of sliced, diced, chopped and/or shredded meats.
- Validate the expected impact of operational controls such as clean room technologies, facility and equipment cleaning procedures.
- Develop and validate measures of effectiveness of existing controls, including naturally cured products. Proposals should address issues specific to small and very small plants.
- Evaluate real-time or near real-time *Listeria* sampling and testing technologies.
- Develop improved and validated quantitative methods for *Lm* detection in foods and environmental samples.

Post-Production Research

- Identify and examine potential transmission and/or contamination vectors in a retail deli environment, including personnel and non-meat RTE deli products.
- Identify interventions to reduce the transmission and/or cross-contamination of *Lm* in the retail deli environment.

Information to Enhance Current and Future *Listeria* Public Health Risk Assessments

- Improve and augment epidemiological data on food attribution for listeriosis, both sporadic and outbreak cases. (see **Priority Focus** for additional detail)
- Develop a White Paper addressing the scientific support behind current process controls employed by the ready-to-eat (RTE) meat and poultry industry. (see **Priority Focus** for additional detail)

Controlling *Salmonella* in Meat and Poultry Products

Priority Focus
Identify interventions that can be applied to the pork carcass and/or trim to reduce the prevalence of <i>Salmonella</i> in pork trim. The intervention's impact on organoleptic properties should be evaluated.
Evaluate whether commonly used interventions for beef carcasses are effective for pork carcasses in reducing <i>Salmonella</i> . The proposal should: <ul style="list-style-type: none">• Develop a protocol to allow for every carcass (beef or pork) to be continually sampled.• Are there other indicators that could be accurately and rapidly measured to determine an "event" day occurrence within a slaughter processing facility?• The protocol should evaluate implementation in commercial environments.
Compare effectiveness of carcass washing and trimming for reduction of <i>Salmonella</i> on pork carcasses. Include an evaluation of current production methods.
Examine the D-values for microorganisms in irradiated products. Are there differences between <i>Salmonella</i> serovars?
Identify likely sources of contamination, risk factors, and how to systematically intervene at the production facility, during transportation and lairage and the levels of <i>Salmonella</i> present on carcasses and meat products. These sources of contamination can include parts of the anatomy, e.g. lymph nodes, joints, etc.
Develop data to support future risk assessments of <i>Salmonella</i> and to estimate the human health risk attributable to beef, pork and/or poultry products.

Innovative Pathogen Intervention Technologies

- Identify likely sources of contamination, risk factors, and how to systematically intervene at the production facility, during transportation and lairage and the levels of *Salmonella* present on carcasses and meat products. (see **Priority Focus** for additional detail)
- Investigate and validate novel intervention technologies for *Salmonella* in meat and poultry products.
- Determine the effectiveness of existing or new intervention technologies on multiple serovars of *Salmonella* including those that are multi-drug resistant (*Salmonella* Typhimurium DT 104; and *Salmonella* Newport MDR-AmpC).
- Identify the potential for *Salmonella* harbors within the post-harvest processing environment and interventions to reduce or eliminate the presence of *Salmonella* in the identified harbors.
- Validate existing and commonly used intervention technologies for *Listeria monocytogenes* and how they impact *Salmonella* survival in fully cooked RTE meat and poultry products. The proposal should address additives and ingredients; and thermal processes.
- Identify interventions that can be applied to the pork carcass and/or trim to reduce the prevalence of *Salmonella* in pork trim. (see **Priority Focus** for additional detail)
- Evaluate whether commonly used interventions for beef carcasses are effective for pork carcasses in reducing *Salmonella*. (see **Priority Focus** for additional detail)

Innovative Pathogen Intervention Technologies continued

- Develop novel interventions to reduce the likelihood of *Salmonella* contamination in products that appear RTE but are not RTE (*i.e.* uncooked, breaded, boneless poultry products that also may be stuffed or filled, charmarked, or artificially colored). The proposal should:
 - Address potential undercooking of products and how growth can be inhibited; and
 - Evaluate the organoleptic properties of the intervention.
- Compare the application of antimicrobials using traditional spray methods and application via electrostatic spray. The proposal should address the efficacy of the treatments, application levels and any potential waste/loss of antimicrobial solutions based on the type of application.
- Compare effectiveness of carcass washing and trimming for reduction of *Salmonella* on pork carcasses. (see **Priority Focus** for additional detail)
- Examine the D-values for microorganisms in irradiated products. (see **Priority Focus** for additional detail)

Information to Enhance Current and Future *Salmonella* Public Health Risk Assessments

- Develop cost-effective quantitative sampling and analytical methods for *Salmonella* on raw meat and poultry products that will provide meaningful data for enhancing public health.
- Investigate the epidemiology of multi-drug resistant *Salmonella* within the production chain and quantify the human health risks associated with these organisms.
- Identify the relationship between prevalence of *Salmonella* on pork carcasses with prevalence on pork trim and their relationship to human illness.
- Develop data to support future risk assessments of *Salmonella* and to estimate the human health risk attributable to beef, pork and/or poultry products.

Other Food Safety Research

Nationwide Survey of Hospitals

There are an estimated 48 million illnesses, more than 125,000 hospitalizations and 3,000 deaths in the United States each year (Scallan *et al*, 2011) due to foodborne illnesses. There is some concern that hospitals and/or physicians are not adequately equipped or trained to diagnose rapidly and treat foodborne illnesses. The survey should address the following:

- Hospital and/or physician capabilities to rapidly diagnose foodborne illnesses
- How does an accurate diagnosis impact patient treatment?
- Are resources being adequately allocated to diagnose and treat foodborne illnesses?
- What is needed to adequately diagnose and treat foodborne illnesses?

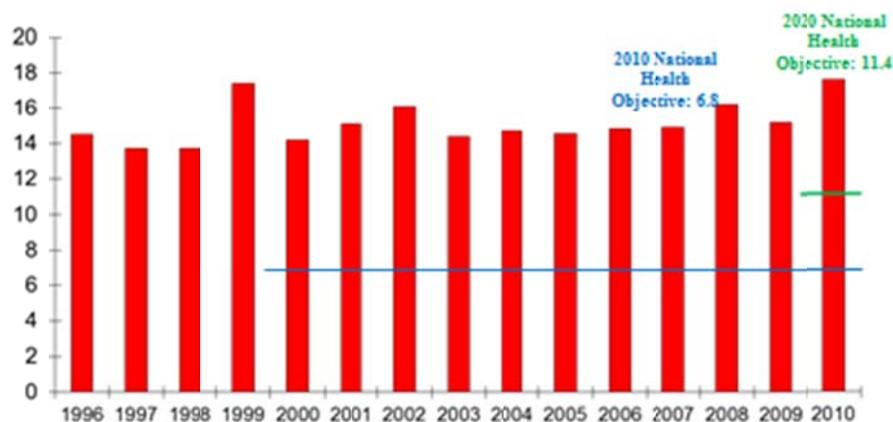
* Proposals with collaborators from the medical profession will be reviewed more favorably.

White Paper on *C. difficile* as a Risk Associated with Animal Sources.

The paper should include the following components:

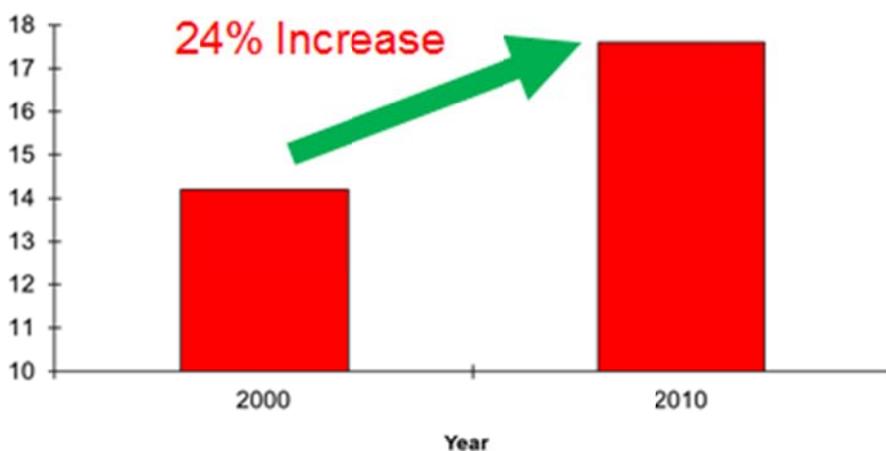
- Summarize all historical data on *C. difficile* and its relationship with animal and non-animal related infections;
- Evaluate hospital nosocomial *C. difficile* infections;
- Evaluate worldwide understanding of *C. difficile* infections and their sources; and
- Identify the data gaps, state how these gaps influence the understanding of *C. difficile*, and propose tasks needed to close the gaps.

Incidence of Foodborne Illness 1996-2010: *Salmonella**



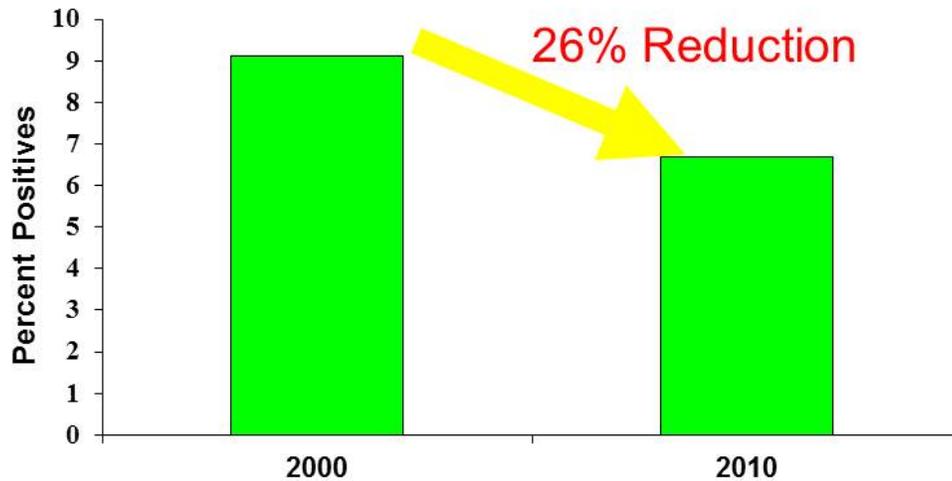
*Vital Signs: Incidence and Trends of Infection with Pathogens Transmitted Commonly Through Food — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 1996–2010

Incidence of Foodborne Illness 2000-2010: *Salmonella**



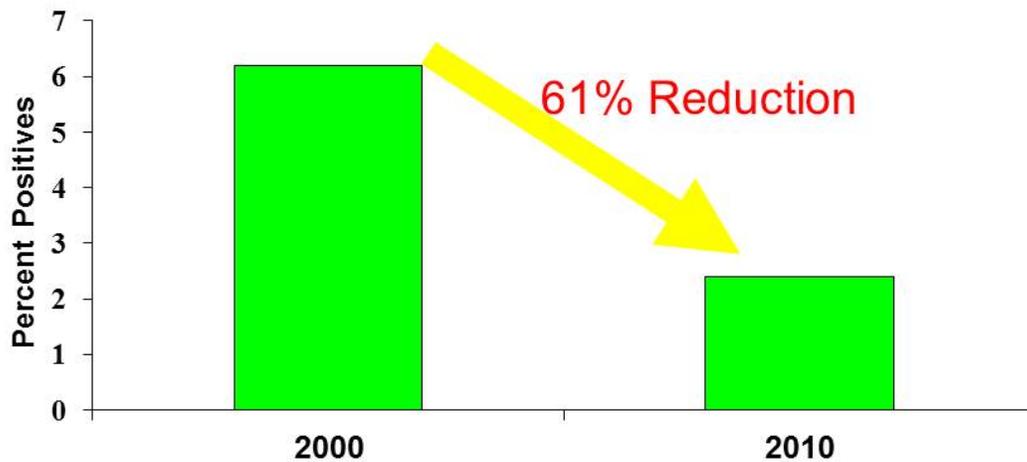
*Vital Signs: Incidence and Trends of Infection with Pathogens Transmitted Commonly Through Food — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 1996–2010

Prevalence of *Salmonella* in Chickens*



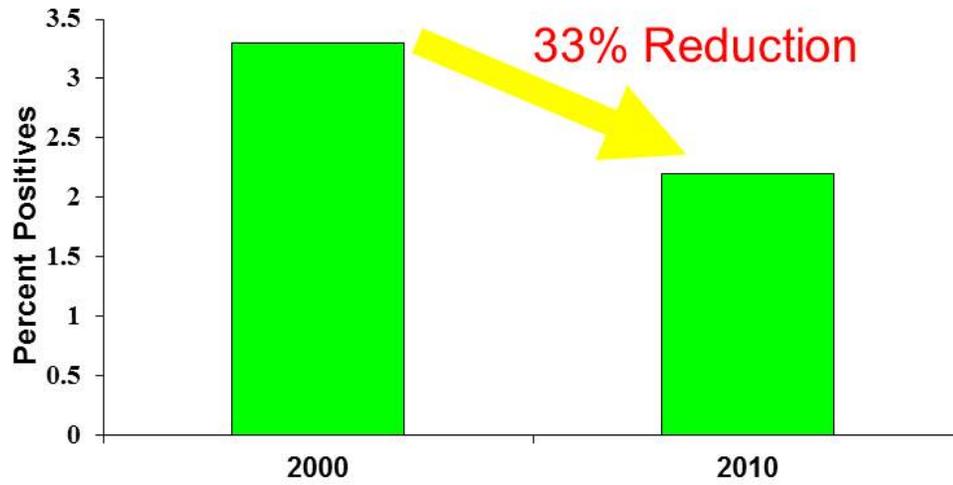
*FSIS results of broilers analyzed for *Salmonella*

Prevalence of *Salmonella* in Pork*



*FSIS results of market hogs analyzed for *Salmonella*

Prevalence of *Salmonella* in Ground Beef*



*FSIS results of ground beef analyzed for *Salmonella*