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NEWS

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Bacteriophage Study Demonstrates Elusive Nature of *E. coli* Control on the Farm

Trojan Calf Model May Prove Useful In Future Research

Controlling *E. coli* O157:H7 in cattle with a bacteriophage that appeared promising in a laboratory setting proved elusive in a Foundation funded bacteriophage study at Washington State University.

The study, titled "Evaluation of the Efficacy of a Bacteriophage System for Preventing or Modulating *Escherichia coli* O157:H7 Infection of Cattle," is one of the first of its kind on cattle.

The study sought to determine if a bacteriophage product that showed promise in the laboratory would reduce *E. coli* O157:H7 in calves already infected with the strain and reduce transmissions to calves in contact with infected animals.

Holstein bull calves between 8 to 10 weeks old were used in the study, with half (5) placed in a control isolation room and the other half (5) placed in a phage isolation room. Calves in the phage isolation room received a dose of 1×10^{10} pfu of bacteriophage orally and through misting into the calves' environment. Calves in the control room were administered distilled water using the same methods.

After several days, researchers introduced into each room a calf with a resistant strain of *E. coli* O157:H7. These calves are termed "Trojan" calves and were used to see if calves

Continued on page 2

Microbiological Advisory Committee Conveys Concerns on *Salmonella* Performance Standard

The National Advisory Committee on Microbiological Criteria for Foods (NACMCF) detailed its concerns about the data used to develop USDA's *Salmonella* Performance Standard when it convened in August. The NACMCF has been asked to examine in detail the role the microbiological performance standards play in assuring microbiological safety.

As part of its work, the NACMCF Subcommittee on Microbiological Performance Standards recently completed a report about performance standards, which was approved by the full NACMCF at the August meeting. Included in the report is a recommendation that the 1998-2001 HACCP verification data should not be used to establish a new performance standard for ground beef or to determine either regional or seasonal variability in *Salmonella* preva-

lence. According to the NACMCF, the initial *Salmonella* performance standard was based on a relatively small data set. Current verification data do not meet the scientific principles for a baseline study necessary to establish or modify *Salmonella* performance standards.

Continued on page 6

Inside this Issue...

Science Soundbites	2
Animal Care & Handling Conference	3
NAS Cloning Report	3
Antimicrobial Animal Drugs	4
Meat Industry Research Conference	4
Chronic Wasting Disease	5
Listeria Workshop	5
AMIF Training Videos	6
Ongoing Research	7

*Science Soundbites***Biosensors Promise Rapid Detection of Food Pathogens**

Biosensors under development at the University of Arkansas can speed detection of harmful bacteria during food processing, according to the Food Safety Consortium.

Yanbin Li, a Food Safety Consortium researcher and biological engineer for the Arkansas Agricultural Experiment Station, is leading an interdisciplinary research team to develop fast, reliable methods for detecting *E. coli*, *Salmonella typhimurium* and other illness-causing bacteria during poultry processing that may make it possible to detect pathogens in hours rather than days.

The methods developed in Li's lab employ sensors with names like immuno electrochemical biosensor, capillary column bioseparator/bioreactor, chemiluminescent optical fiber biosensor and impedance immunosensor. The prototype sensors he has developed can detect several pathogens, including *Salmonella* and *Listeria*, but so far he has had the most reliable results with *E. coli* O157:H7.

Dried Plum May Fight Pathogens. New research by Kansas State University researcher Daniel Fung, Ph.D., and Leslie Thompson indicate that the addition of dried plum mixtures significantly reduced levels of *Salmonella typhimurium*, *Yersinia enterocolitica*, *Staphylococcus aureus*, *Listeria monocytogenes* and *E. coli* O157:H7 in uncooked ground beef and uncooked pork sausages that had been deliberately inoculated with the pathogens for testing.

Earlier research by Jimmy Keeton, Ph.D., at Texas A&M University found that sorbitol in plum extracts can keep ground beef moist even after reheating.

Understanding Biofilms Can Lead to Better Control, Patient Management. The Centers for Disease Control and Prevention Biofilm Laboratory Team Leader Rodney M. Donlan recently published a paper detailing the challenge biofilms (an assemblage of microbial cells that are not removed easily and which enclose themselves in a "web" of polysaccharide material) pose in a variety of environments and a host of equipment and devices.

Biofilms can pose challenges in sanitizing equipment in food processing plants, and also can harbor bacteria on medical devices like heart valves and prostheses. To view "Biofilms: Microbial Life on Surfaces," visit the CDC web site at <http://www.cdc.gov>.

Petting Zoos May Pose *E. coli* Risk. A paper in the August 22 *New England Journal of Medicine*

showed that 51 people with confirmed or suspected cases of *E. coli* O157:H7 likely contracted the disease through contact with calves and their environment during a visit to a dairy farm. The study showed that hand washing was protective against infection. Environmental studies showed that 28 of the 216 cattle on the farm (13 percent) were colonized with *E. coli* O157:H7 that had the same distinct pattern on pulsed-field gel electrophoresis that was found in isolates from the patients. This organism was also recovered from surfaces that were accessible to the public.

Cured Meat Consumption During Pregnancy. A new study by Y.K. Shim and W.E. Kaye of the Agency for Toxic Substances and Disease Registry, part of the Department of Health and Human Services, found that a mother's intake of vitamin C, vitamin E or iron supplements during pregnancy was associated with a significant protective affect against brain cancer in offspring.

While researchers interviewed mothers of children with brain tumors throughout four states about their cured meat consumption during pregnancy, the study concluded that cured meat consumption was not associated with an increase risk of brain tumors in children.

Bacteriophage Study

Continued from page 1

treated with the bacteriophage were resistant to the disease strain. The remaining calves in the room were termed "in-contact" calves.

The average shedding level in all the Trojan and in-contact calves did not differ significantly from those calves given the bacteriophage treatment. A lower, but insignificant, percentage of in-contact calves in the phage treated room were positive for *E. coli* O157:H7 shedding.

Researchers did make an unintentional, yet important, discovery they dubbed the "Trojan calf theory." A calf that was inoculated with high levels of *E. coli* O157:H7 and introduced into a pen of non-inoculated calves quickly infected all the other calves in the pen. The resulting natural inoculation is less costly for researchers and serves to mimic natural environmental conditions of the farm more closely.

Washington State researchers will use the study's findings to further develop the Trojan calf challenge model and to test a candidate vaccine in collaboration with an NIH-funded project of Carolyn Bohach at University of Idaho.

Fifth AMIF Animal Care and Handling Conference Slated for February 27-28, 2003, in Kansas City

Ten Cosponsors Will Participate in Expanded Conference

AMIF's Fifth Annual Animal Care and Handling Conference will be held February 27-28, 2003, at the Hyatt Regency Crown Center in Kansas City, MO. The conference is the largest of its kind in the industry and last year attracted nearly 300 people.

Conference cosponsors include the Animal Agriculture Alliance, Food Marketing Institute, National Cattlemen's Beef Association, National Chicken Council, National Council of Chain Restaurants, National Grocers Association, National Milk Producers Federation, National Pork Board, National Turkey Federation and United Egg Producers.

The two-day conference features a day dedicated to "big-picture issues" like regulatory developments, customer initiatives, creating an animal welfare mindset in plants and operations and retaining an audit team. The second day allows participants to break into one of four species-specific sessions: beef, pork, poultry or egg production. During these sessions, species experts will instruct in the specific details and latest research on handling and stunning livestock and poultry to create optimal welfare.

More than two dozen experts in the field of animal welfare, auditing, product quality and livestock and poultry production will offer instruction. In addition, companies that market animal handling and stunning equipment and those that offer consulting and auditing services will exhibit their products during a reception. This offers attendees excellent oppor-

tunities to ask specific questions of these equipment and service providers.

The National Pork Board this year will offer its Trucker Quality Assurance Program the day prior to the conference in the same hotel. The program is designed as a train the trainer session to educate transporters about ways to improve animal handling and decrease hog stress.

The Animal Care and Handling Conference has received consistently high participant ratings year after year. Attendees leave the conference with detailed information and practical ideas they can implement in their plants and operations. The conference provides attendees with information-sharing opportunities so they can exchange "best practices" that will help enhance animal handling throughout the meat and poultry industry.

Registration fees for the conference are \$325 for members of AMI or any of the cosponsoring organizations and \$295 when three or more members register together. The non-member rate is \$450. Registration for the special Trucker Quality Assurance Program is \$125.

To register, visit www.MeatAMI.com and click on Industry Events. To reserve a room, call the hotel at 816-421-1234 by February 6, 2003, and mention AMIF to receive the conference rate of \$125 single, \$135 double. To exhibit at the conference, contact AMI Vice President of Education Patricia Pines at 703/841-3620 or ppines@meatami.com.

NAS Finds No Evidence that Products from Cloned Livestock Pose Safety Risk

Report Concludes That Environmental Impact is Larger Concern

The National Academy of Sciences National Research Council (NRC) said there is insufficient evidence that food products derived from cloned livestock are unsafe for human consumption.

Rather, NRC said the larger concern is the possibility of certain genetically engineered fish and other animals escaping and potentially introducing engineered genes into wild populations. The committee did say that additional information about food composition, which could be collected using available analytical tests, is needed to continue to evaluate food safety issues, particularly allergenicity issues.

The report was requested by the Food and Drug Administration, which is preparing to regulate certain animal-biotechnology products, particularly cloned cattle. The committee was asked to identify

science-based concerns and was not asked to identify potential benefits from animal biotechnology or to make policy recommendations.

The committee said the greatest concern is the ability of certain genetically engineered organisms to escape and reproduce in the natural environment. Genetically engineered insects, shellfish, fish, and other animals that can easily escape and that are highly mobile are of particular concern, especially if they are more successful at reproduction than their natural counterparts. Livestock and poultry that are more easily confined are less of a concern.

By creating "transgenic" animals with genes from another species, or by removing or "turning off" genes, animals can be produced to grow bigger and

Continued on page 8

FDA Releases Guidance to Evaluate Animal Drug Safety

New Survey Shows Decline in Antibiotic Use in Livestock

FDA released a draft guidance to help assess the safety of new antimicrobial animal drugs, with an eye on the microbiological effects on bacteria of human health concern. The agency is concerned that the use of antimicrobial drugs in food-producing animals may lead to the emergence of bacterial pathogens that may be harmful to humans and become resistant to drugs used to treat human illness.

The draft guidance document is titled "Guidance for the Industry: Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern." The recommendations detail an approach for addressing the concerns as part of the overall preapproval safety evaluation of new animal drugs.

The guidelines describe a particular methodology that the sponsors of new animal drugs can use to complete an antimicrobial resistance risk assessment. The document also outlines a process for integrating relevant information into the risk assessment and discusses possible risk management strategies.

FDA will collect public comments on the policy for 75 days. A copy of the draft guidelines is available at <http://www.fda.gov/cvm/guidance/published.htm>.

Survey Shows Decline in Use of Antibiotics

Meanwhile, data from a survey of animal health companies reveal that the volume of antibiotics used in animals in the U.S. steadily declined over

the past three years despite annual increases in meat production. In 2001, 21.8 million pounds of antibiotics were sold, dropping from 23.7 million pounds in 2000 and 24 million in 1999. The data were collected from a survey of members of the Animal Health Institute (AHI). The survey data include antibiotics used for both farm and companion animals.

The data were presented last month during a symposium called "Antibiotic Use in Food Animals: Impact on Resistance in Humans" at the 42nd Interscience Conference on Antimicrobial Agents and Chemotherapy. According to AHI, while meat production between 1999 and 2001 rose 1.1 million pounds, use of antibiotics is not rising. Therefore, the amount of antibiotics used per pound of meat produced is going down.

AHI survey respondents provide an assessment each year of the amount of veterinary antibiotics sold for therapeutic use and health maintenance purposes. FDA has approved antibiotics for use in animal husbandry for four basic purposes: disease treatment, disease control, disease prevention and health maintenance. Health maintenance has frequently been called "growth promotion." Therapeutic use of antibiotics to treat, control and prevent diseases continues to comprise more than 80 percent of total use.

Meat Industry Research Conference Slated For October 24-26 in New Orleans

Meeting Will Feature International Irradiation Expert, Other Leading Scientists

The Meat Industry Research Conference (MIRC), an annual event bringing meat and poultry industry scientists and researchers together, will be held in conjunction with the American Meat Institute's Annual Convention and Innovation Showcase in New Orleans, LA, October 24 – 26, 2002.

"The MIRC has developed a reputation as one of the leading meat science conferences," said AMI Foundation President James H. Hodges. "This event encourages information sharing on the most important issues to daily operation in the industry."

The MIRC will focus on research centered on meeting consumers needs through quality, consistency, new ingredient technologies and food safety interventions. The range of technical topics covered will appeal to industry representatives involved in applied meat research, product develop-

ment, quality control and food safety.

Irradiation Expert Featured

Notably this year, MIRC will feature internationally recognized irradiation expert Morton Satin and University of Arkansas researcher Fred W. Pohlman, Ph.D., who will take a close look at the status of various up-and-coming pathogen reduction strategies as well as irradiation of ground beef products. Satin, executive director of the International Food and Agribusiness Management Association, will emphasize the tradeoffs between microbial inactivation and maintaining product quality attributes. He also is expected to share insights into consumer acceptance of the technology. Pohlman will provide an overview of recently completed

Continued on page 8

Chronic Wasting Disease Spreading Among U.S. Deer and Elk, APHIS Submits Plan to Congress

Chronic Wasting Disease (CWD) continues to afflict deer and elk herds in the Midwestern states of Colorado, Wyoming, Nebraska, Wisconsin and New Mexico. While new cases continue to arise, USDA and the Department of the Interior delivered a national plan to Congress for assisting states, federal agencies and tribes in controlling the growing threat to elk and deer from this disease.

The plan details how federal agencies can assist states and help develop consensus-based approaches that states and industry can adopt to manage the disease. Several states have established CWD programs, but lack of resources in some states and lack of uniform standards have prevented the setting of minimum criteria for an effective nationwide program.

A joint working group developed a plan that addresses disease management, diagnostics, research, surveillance and information dissemination. Highlights of the plan's proposals include:

- Identification of best practices for herd management to help prevent introduction of CWD into the herd;

- Animal identification and culling versus eradication, and how to prevent contact between free-ranging and captive animals;
- Development of better tests for the disease, both postmortem and anti-mortem;
- Prioritization of critical research needs, genotyping and transmissibility;
- Description of best practices for targeted, hunter-harvest and outbreak surveillance; and
- Development of uniform standards for disease data collection and information transfer through a web-based application.

Plan details and updates on the disease are available on the web at: www.aphis.usda.gov/oa/cwd/index.html.

CWD, a transmissible spongiform encephalopathy, currently is known to affect free-ranging deer and/or elk in Colorado, Wyoming, Nebraska, Wisconsin and New Mexico. States that currently have or have had farmed elk herds with the disease are South Dakota, Nebraska, Colorado, Kansas, Oklahoma and Montana. There is no evidence that the disease is linked to any disease in humans or domestic animals.

AMIF-NMA *Listeria* Intervention and Control Workshop Set for December 4-5, 2002, in Cincinnati

AMIF, together with the National Meat Association (NMA), will hold the popular workshop "Implementing *Listeria* Intervention and Control" December 4 - 5, 2002, at the Hilton Cincinnati, Netherland Plaza in Cincinnati, OH.

The course is designed to help participants examine the issues surrounding control of *Listeria monocytogenes* in ready-to-eat meat processing and to provide experience in developing appropriate procedures for processing and handling ready-to-eat meat and poultry products. USDA's Food Safety and Inspection Service will soon require plants producing ready-to-eat products to implement an environmental testing program for the pathogen.

The two-day workshop will address sanitary design, product formulation and post packing technology, microbiological sampling, data analysis, and investigation and corrective actions. The workshop also will include a technology fair where attendees can meet directly with suppliers.

Participants also will work through on-the-job product sampling scenarios in small groups with AMI regulatory and scientific affairs staff who will be on hand to answer questions and help solve problems.

Workshop leaders are unique because they are "working food safety/HACCP experts" from Cargill, Inc., ConAgra Refrigerated Foods, Inc., Hormel Foods Corporation, Ecolab Inc., John Morrell & Co., Land O' Frost, Inc. and Oscar Mayer/Kraft Foods.

Registration is \$595 for AMI or NMA members, \$495 when three or more members register together, \$1,000 for exhibitors and \$695 for non-members. Registration is limited to 60 participants to ensure a quality learning experience. To register visit, www.MeatAMI.com or contact Katie Brannan, 703/841-3621, kbrannan@meatami.com

Salmonella Performance Standard

Continued from page 1

Instead, NACMCF recommended that FSIS conduct another nationwide microbiological survey for ground products of interest, as well as for trimmings (and other ground product source materials), over 12 consecutive months, stratified by production volume, month and region. Testing should include examination for *Salmonella*, coliforms, *E. coli* and other indicator organisms that may have potential for measurement of "cold chain management" or process control.

Committee Responds to Murano

Late last year, USDA Under Secretary for Food Safety Elsa Murano submitted a list of questions to the committee about performance standards. During the August meeting, the subcommittee reported their responses.

Among Murano's questions was "How are these standards working and are they helping to ensure the safety of the nation's meat and poultry supply?" The NACMCF replied that microbiological performance standards are important tools in advancing the microbiological safety of meat and poultry because they help the agency communicate the agency's expected level of control of the HACCP system, including SSOPs. The committee also said that performance standards have stimulated the development and implementation of food safety intervention strategies. Although FoodNet data indicates that cases of salmonellosis have decreased 15% between 1996 and 2001, the subcommittee pointed out that the proportion of salmonellosis linked to the meat and poultry supply cannot be determined from the data. Thus, the existing public health statistics make it very difficult to specifically attribute disease reductions to the *Salmonella* Performance Standard.

The committee also noted that a decreased incidence in *Salmonella*, as indicated by FSIS verification sampling and testing, has not led to a decrease in disease associated with *E. coli* O157:H7 in ground beef. This conclusion is significant because USDA had argued in response to a challenge to the *Salmonella* Performance Standard that *Salmonella* was an indicator of the presence of *E. coli* O157:H7 - an argument the court rejected.

"In this instance, the underlying assumptions of the performance standard need to be reexamined. Before new standards or approaches are adopted, alternative standards or approaches need to be examined," the subcommittee concluded.

Murano also asked the committee if there are more effective alternatives to these *Salmonella* performance standards and if they might include

the use of indicator organisms in lieu of *Salmonella* standards, mandated pathogen control at farm or grow out, mandated ante-mortem pathogen control, mandated performance criterion for pathogen reduction at specific steps in production, mandated specific interventions and mandated continuous improvement criteria for plant performance within specific time periods.

The NACMCF provided 10 recommendations as part of the answers to these two questions, including a greater role for CDC in measuring the impact of performance standards on public health and more research on the farm and feedlot.

Portions of the report that have been adopted by the NACMCF are posted at http://www.fsis.usda.gov/ophs/nacmcf/rep_stand.htm.

The National Academy of Sciences also has been charged with a review of microbiological performance standards. Its review of the issue is expected to be released in the first quarter of 2003.

AMIF To Release Animal Handling Training Videos in Spanish

The AMI Foundation will soon unveil Spanish versions of the popular "Good Animal Handling Practices for Beef Processors" and "Good Animal Handling Practices for Pork Processors."

The English versions of the training videos were released in 1999 as part of a joint effort between AMIF, Grandin Livestock Handling Systems and McDonald's. The 13-minute video has been distributed widely and feature Temple Grandin, Ph.D., assistant professor of animal science at Colorado State University, as the primary instructor. In the video, Grandin discusses key measures of animal welfare in packing plants and details how to conduct an animal handling and stunning self-audit.

Spanish versions of the popular video are available for \$55 including shipping and handling. To order, visit <http://www.AMIF.org> to download an order form, which may be faxed to AMIF at 703/527-0938. Orders must be prepaid by check or credit card.

Questions should be directed to AMIF Education and Convention Coordinator Laura Quartuccio, 703/841-3648, lquartuccio@meatami.com.

Ongoing Research - *Listeria monocytogenes*

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
Amy C. Lee Wong	University of Wisconsin -Madison	Reduction of <i>Listeria monocytogenes</i> Biofilm Formation in RTE Meat Processing Environments
Kalidas Shetty	University of Massachusetts	Elite Herb Extracts Containing High Rosmarinic Acid and Inhibition of <i>Listeria monocytogenes</i> in Meat and Poultry Products
Harshavardhan Thippareddi	Kansas State University	Control of <i>Listeria monocytogenes</i> in Ready-to-Eat Meats Using Cetyl Pyridinium Chloride (CPC) and Shelf Life Extension of RTE Meats Treated with CPC
Michael Doyle	University of Georgia	Control of <i>Listeria monocytogenes</i> in Food Processing Facilities by Competitive Exclusion Microorganisms
Jimmy Keeton	Texas A&M University	Antimicrobial Effects of Surface Treatments and Ingredients on Cured RTE Meat Products
Jeffrey Kornacki	University of Georgia	Recovery, Development and Validation of Appropriate Surrogate Microorganisms in Meat and Poultry Emulsions for In-plant Critical Control Point Validation Studies
Jeffrey Kornacki	University of Georgia	The Role of Aerosols in Transmission of Microorganisms (including <i>Listeria</i>) to Ready-to-Eat Meat/Poultry Products
Ferencz Denes	University of Wisconsin -Madison	Plasma-Enhanced Disinfection of Surfaces, Air And Water in Ready-To-Eat (RTE) Meat and Poultry Processing Environments
Robert Vinopal, Dick Jadamec	University of Connecticut	Development of Ion Mobility Spectrometry (IMS) Applications for <i>Listeria</i> Detection and Monitoring In-Plant Food Processing Plants

Ongoing Research - *E. coli* O157:H7

<u>Investigator</u>	<u>Institution</u>	<u>Project Title</u>
Andrew Benson	University of Nebraska	Distribution of Virulent and Avirulent Subclones of <i>E. coli</i> O157:H7 in the U.S.
Dale Hancock	Washington State University	Evaluation of Efficacy of a Bacteriophage System in Preventing or Modulating <i>E. coli</i> O157:H7 Infection of Cattle
Alison O'Brien	Uniformed Services University of the Health Sciences	<i>E. coli</i> O157:H7 Intimin Expressed by Transgenic Plant Cells as a Candidate Oral Vaccine for Cattle
Michael Doyle	University of Georgia	Methods to Control <i>E. coli</i> O157:H7 in Drinking Water for Cattle
Chobi DebRoy	Pennsylvania State University	Competitive Exclusion of <i>Escherichia coli</i> O157 using Non Pathogenic Colicin Producing <i>Escherichia coli</i> Strains
Charles Kaspar	University of Wisconsin - Madison	The Use of Egg Yolk Anti-O157:H7 Immunoglobulin to Clear <i>E. coli</i> O157:H7 from the Intestinal Tracts of Cattle

Meat Industry Research Conference

Continued from page 4

research on microbial interventions for beef trim. This special session also will include input from a panel of food safety and communications personnel from companies currently marketing irradiated products. Jeanne Colleluori, communications specialist at Wegman's Food Markets Inc., Kathleen O'Donnell, corporate food safety specialist at Wegman's Food Market, and Glenn Lindsey, vice president of research and development at Dairy Queen, will present case studies on marketing and consumer acceptance of irradiated ground beef products in retail and foodservice segments. The conference this year also will feature speakers from academia and trade organizations including Jimmy Keeton, Ph.D., Texas A & M University; Peter Muriana, Ph.D., Oklahoma State University; Floyd McKeith, University of Illinois; Ken Prusa,

Ph.D., Iowa State University; Jim Stonehocker, Odom's Tennessee Pride Sausage Company; Mark Grace, Thinkage; Steven J. Goodfellow, Deibel Laboratories, Inc.; Carl Blackwell, National Cattlemen's Beef Association (NCBA); Ken Johnson, NCBA; Peter Bodnaruk, Food Science Australia; and David Meisinger, Ph.D., National Pork Board.

Scheduled session topics include

- New developments in fabrication techniques for beef and pork cuts and how these technologies can help meet consumers' needs;
- Insights on recent beef and pork quality audits and benchmarking studies;
- A review of current and emerging ingredient technology aimed at improving quality, safety, shelf life and consistency.
- A review of best practices for validating processes in the plant environment.

Cloned Livestock

Continued from page 3

more rapidly, or to possess beneficial traits like meat with more protein and less fat. And through somatic cell nuclear transfer — the technique used to clone Dolly the sheep — scientists can create an almost identical copy of an adult animal with desirable traits.

According to the NRC, there is a low probability that a few new proteins expressed when genes are inserted from another species may trigger allergic or hypersensitive reactions in a small, but unknown, percentage of people. The potential for allergenicity is difficult to gauge, however, since it can only be detected once a person is exposed and experiences a reaction. The uncertainty surrounding new proteins and potential impact on consum-

ers who may be allergic is serious enough to elicit a moderate level of concern, according to the committee.

Animals genetically engineered to produce non-food products, such as cows that produce drugs in their milk, are not intended to enter the food supply. Controls must be in place to ensure restrictions on the use of carcasses from such animals, according to the committee.

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Upcoming AMIF Events

October 24 - 26, 2002
AMI Annual Convention and Innovation Showcase
 Hilton New Orleans Riverside, New Orleans, LA

October 24 - 26, 2002
Meat Industry Research Conference (MIRC)
 Hilton New Orleans Riverside, New Orleans, LA

December 4 - 5, 2002
Implementing Listeria Intervention & Control Workshop
 Hilton Cincinnati, Netherland Plaza
 Cincinnati, OH

January 21, 2003
Sanitary Design Principles for Ready-To-Eat Processing Equipment
 Hilton Atlanta, Atlanta, GA

February 27 - 28, 2003
Animal Care and Handling Conference
 Hyatt Regency Crown Center, Kansas City, MO