

Statement by Frederic J. Hoerr, DVM, PhD

Director
Thompson Bishop Sparks State Diagnostic Laboratory
State of Alabama Department of Agriculture and Industries

and

Professor
College of Veterinary Medicine
Auburn University

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Farm to Fork: Partnerships to Protect the Food You Eat

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Mr. Chairman, Ranking Member, and Members of the Committee. Thank you for the invitation to present this testimony on the activities of Auburn University relative to food protection, particularly those aspects related to agroterrorism. My name is Frederic Hoerr. As a veterinarian with specialties in pathology and in poultry medicine, I have worked with the poultry industry in Alabama since 1980. For the past 20 years, I have served as the director of the state diagnostic laboratories for Alabama, a program of the Alabama Department of Agriculture and Industries, The Honorable Ron Sparks, Commissioner. I hold a joint appointment in the Auburn University College of Veterinary Medicine at the faculty rank of Professor

Auburn University is a top-50 ranked public university that has provided instruction, research and outreach to benefit Alabama and the nation for more than 150 years. Auburn contributes to our nation's homeland security through a number of innovative programs, including AU's unique ability in canine explosives and drug detection training and AU's robust first responder training activities that utilize the highly flexible Advanced Conflict and Tactical Simulation (ACATS) exercise software

In many ways, Alabama is a microcosm of the interstate and international scope of agriculture today. States with intensive agriculture must rehearse for rapid and effective response to an agroterrorism event, develop rapid detection capabilities for agents of agroterrorism, create a awareness of the issues among the agricultural producers, and train agricultural first responders. Auburn University is addressing these key components not only for the state of Alabama, but with technological developments and programs that can benefit the nation as a whole.

Alabama ranks third nationally in broiler chicken production and 9th in beef cow production. These rankings translate to a substantial economic presence in the state with nearly 4000 poultry farms producing 20 million chickens each week. The 2002 USDA Agricultural Census maps show many counties clustered in north and south Alabama having 75% or more of their total economy based on poultry production. Alabama chickens are a healthy and wholesome food shipped to consumers throughout the country and exported throughout the world. Many poultry farms are also ideally suited for the production of beef cattle, especially beef cows producing calves that are shipped to feedlots in western states. The poultry-beef farming connection is exemplified by Cullman County, which ranks first in the state in poultry and cattle production, and second in dairy production. Dairy production in Alabama now occurs on fewer than 90 farms, with much of the state's milk supply imported from Texas and New Mexico.

From these basic farm facts emerge several agroterrorism concerns. The density of production farms in poultry-rearing areas creates a major challenge to prevent the rapid spread of a highly contagious disease, whether it is introduced naturally or maliciously. Centers of poultry production in Alabama extend across the state lines into Georgia, Florida, Mississippi and Tennessee. Ten to 20 percent of poultry products are exported and therefore vulnerable to rapid closure of export markets in the event of a disease

emergency. Calves produced in Alabama are shipped out of state to realize their economic potential and require health certificates to travel interstate. During an animal disease emergency, farm quarantines for either a poultry or cattle disease could severely impact all of the poultry, beef, and dairy production within a quarantine zone involving one or more counties. This could result in not only the direct loss of animals on the farm, but also economic losses from an inability to process rapidly growing poultry at the market weight, the closing of interstate shipments of cattle and poultry products, and the overnight loss of export markets. Those who work in diagnostic and regulatory testing of livestock and poultry are reminded are ever mindful of this potential reality. The line between an agroterrorism event and a threat to a major segment of the food supply is only a matter of the severity of given situation, and the effectiveness of the response to it.

Auburn University's mission is defined by its Land-grant traditions of service and access. Several significant advances relative to acts of agroterrorism and safety of the food supply are highlighted in the following.

Detection. The Auburn University Detection and Food Safety Center (AUDFS) links and coordinates researchers from five Auburn University colleges: Agriculture, Engineering, Human Sciences, Sciences and Mathematics, and Veterinary Medicine. Core faculty work together to address the need for next-generation sensors and information systems for the detection of food contamination, and rapid inventory and traceability of food products. The results of this research will benefit national and international efforts to detect threats to the food supply system. AUDFS seeks to combine advances in the identification of foodborne illnesses and contaminants with the latest in biosensor technology. The goal is to have a system that monitors food products from production to consumption, thereby eliminating or reducing significantly the threat of foodborne bacteria, pathogens and toxins reaching our dinner tables and restaurants. AUDFS fosters multidisciplinary programs leading to synergistic collaborations between university researchers and the detection industry. It facilitates technology transfer from the university to product development, and encourages joint industry-university research collaborations. Potential applications include technology to instantaneously evaluate food safety at port-of-entry inspection stations; ascertain the presence of ruminant meat-and-bone-meal (MBM) in agricultural feed, thereby preventing bovine spongiform encephalopathy (BSE) from infiltrating the food-supply chain; and identifying, warning and tracing problems in food processing lines.

Two core faculty members of AUDFS, who are located at the College of Veterinary Medicine, focus on improved detection technologies. Dr. Vitaly Vodyanoy studies sensory physiology and the biophysics of odor detection using the canine nose and its highly sensitive sense of smell (olfactory system). The aims are to determine the initial chemoreceptive events in the animal olfactory system and to find out how the odor-related information translates into electrical events in the cellular level. The potential application of this research is to produce new or improved artificial systems responsive to very small concentrations of odorant. The objective is to develop an electrochemical sensor that shares basic molecular mechanisms associated with the sense of smell. Dr. Valery Petrenko studies small viruses (phage) that infect bacteria. He discovered that

specific proteins on the outer surface of the phage can be employed as sensitive and specific detectors of *Bacillus anthracis* (anthrax) spores as well as Salmonella. He is developing additional applications for other pathogenic viruses, bacteria, and toxins.

The cooperative relationship between Auburn University and the state diagnostic laboratory now extends to 60 years. The state laboratory emerged from the post-war veterinary school in 1947, progressing to the new Thompson Bishop Sparks State Diagnostic Laboratory, a program of the Alabama Department of Agriculture and Industries, in 2006. This Biosafety Level 2 and 3 facility is the central animal disease diagnostic laboratory in a four-laboratory system. Diagnostic and regulatory testing is provided for livestock, poultry, wildlife, and companion animals. The Auburn laboratory, a member of the National Animal Health Laboratory Network, provides full service diagnostic testing to determine the cause animal mortality, as well as regulatory testing for interstate and international movement of animals. The state laboratories will conduct 900,000 diagnostic tests in 2007, including surveillance for avian influenza in poultry, waterfowl, and wild birds. The state laboratories are linked to the National Veterinary Services Laboratory for confirmatory testing for emerging and foreign animal diseases. This laboratory is the most likely first-site of laboratory assessment and preliminary determination of an agroterrorism event involving animal health in Alabama. Because of the size of poultry production in the southeastern U.S. and the potentially rapid spread of an infectious disease, this detection capability has major regional impact.

The diagnostic laboratory is both a consumer and developer of new detection procedures and technologies. As the point of first detection of emerging diseases in Alabama, numerous research projects at Auburn University have been initiated through the years by diagnostic laboratory findings of infectious diseases of poultry and livestock.

Response. Auburn University is the pilot site for deployment and training of a conflict response modeling program, Advanced Conflict and Tactical Simulation (ACATS). This U.S. military-developed program is being refined and tested as an emergency response and homeland security preparedness trainer for local, state and regional public service agencies. ACATS provides realistic and real-time computer simulation to improve domestic response preparedness rehearsal activities. The computer simulation program integrates terrain and structures, vehicles and equipment, line of site responder views, sensor data, weather, casualty modeling, human fatigue factors, and chemical dispersion models for real-time modeling. ACATS has potential application to agro/food supply terrorism with appropriate refinements, especially large venue events, which could rapidly occur in the poultry or cattle producing regions of Alabama and throughout the nation. ACATS testing is in the early stages with lead agencies in eight national regions, and will eventually link deployment sites in every state across the nation.

The first egg-injected vaccine to protect chickens against avian influenza (AI), a virus threatening human health and global poultry populations, has been developed by Dr. Haroldo Toro, at the College of Veterinary Medicine in collaboration with researchers at Vaxin Inc. of Birmingham, AL. This vaccine has the potential to diminish the spread of

highly pathogenic avian influenza in large commercial poultry production facilities located throughout the world.

The vaccine can provide a high degree of protection once an outbreak's strain is determined. The researchers inserted a gene from a low pathogenic avian flu virus strain (H5N9) into a non-replicating human virus (a Vaxin proprietary technology), which was then injected into developing chicken embryos still in the egg. In trials with the vaccine against two highly pathogenic avian flu viruses, a Vietnam H5N1 strain and a Mexican H5N2 strain, the results showed acceptable to excellent protection. Current AI vaccines have inherent constraints against large volume production and must be administered to individual birds by hand application. This vaccine can be produced in high volume and robotically administered into the incubating egg several days before the chick hatches, both major advantages.

U.S. poultry producers, with a few specific exceptions, do not vaccinate for AI and their flocks have no protection to the disease should exposure occur, such as during a bioterrorism event. Dr. Toro's work is a significant advancement because of the millions of chickens that may need to be rapidly vaccinated in the face of an outbreak. This vaccine technology provides for rapid production of a strain-specific vaccine that can be applied to large populations of chickens, protecting the viability of the poultry industry, as well as the poultry meat protein in the food supply. It could also significantly reduce the public health threat that could develop with certain AI strains amplifying in commercial poultry flocks.

Awareness. Dr. Robert Norton, of the College of Agriculture, publishes a daily news digest of agroterrorism-related news as well as a similar list devoted to avian influenza, with linkages to the unclassified avian influenza mapping system (AIMS) (nortora@ag-security.com). The subscribers to this list number in the thousands, representing most states and several countries. Faculty members in the College of Agriculture consult with Federal agencies about protecting agriculture and food production. The close working relationship between Auburn faculty and poultry and livestock producers in Alabama enhances the value of this information transfer.

Extension specialists in the Alabama Cooperative Extension System are working with specialists from the southeastern U.S. to develop the Extension Disaster Education Network (EDEN), which includes agroterrorism awareness information. EDEN is a working partnership of extension specialists, livestock and poultry producers, and emergency responders to help protect the food supply system.

Agricultural and veterinary faculty members participate in the Annual Agroterrorism Conference sponsored by the South Central Center for Public Health Preparedness at University of Alabama at Birmingham, and the Alabama Department of Agriculture and Industries. Two recent publications by Auburn veterinarians in the Journal of American Veterinary Medical Association delineate role of veterinarians, including small animal veterinarians, in biological and agricultural terrorism (JAVMA (2007) 230:494-500; 1476-80).

Training. Auburn University has significant collaboration with the Department of Homeland Security at the Center for Domestic Preparedness in Anniston, Alabama. Four faculty members from the College of Veterinary Medicine provide instruction in the Agricultural Emergency Response Training program (AgERT). Thirteen training sessions with 32 students each are held annually, training a total 416 first responders from across the nation each year. The trainees include fire fighters, HAZMAT specialists, veterinarians and veterinary technicians, and agricultural first responders. The Auburn instructors present instruction on epidemiology, foreign animal disease recognition, animal restraint and euthanasia, and methods of mass carcass disposal. This course is the only training of this type that includes hands-on experience with post mortem examination of animals under adverse field conditions, presented as a scenario at the College of Veterinary Medicine.

The future. Auburn University is a prime force that supports the state of Alabama's efforts to move to a knowledge-based economy, taking its place as one of the nation's preeminent comprehensive land-grant universities in the 21st century. In this spirit, Auburn continues to focus strategically its agriculture and food safety programs; yielding results that broadly benefit the national effort to protect the food supply. The AU Detection and Food Safety Center is yielding technologies available for transfer to the market place and implementation. The development of the avian influenza vaccine reflects the partnership of the private and public university research sectors.

This synergism should expand with the Auburn Research Park, scheduled to open in 2008. The research park will help create new academic, research, and entrepreneurial opportunities for Auburn faculty and students, and help build stronger partnerships with business and industry. Agriculture and food safety can become chief beneficiaries of this effort. The ACATS program is a technological development that can bring Auburn University into partnership with small municipalities and county governments state-of-the-art modeling and rehearsal scenarios. The state diagnostic laboratory, with linkages to Auburn University, the Alabama Department of Public Health, the USDA, as the Alabama Department of Agriculture, and the NAHLN is positioned for modeling exercises. With five veterinarians trained in Foreign Animal Disease diagnosis at the Plum Island, the laboratory is developing closer relationships to hands-on training of veterinary students from Auburn University and nearby Tuskegee University in pathology skills needed recognized and respond to an agroterrorism event.

The future success of Auburn University requires that it be accountable to the citizens of Alabama and the nation. This is essential to maintaining a strong innovative faculty and the facilities to support expanding research programs of an increasingly complex nature.

Follow-up Address

Frederic J. Hoerr

Thompson Bishop Sparks State Diagnostic Laboratory

P.O. Box 2209

890 Simms Road

Auburn, Alabama 36832

Office: 334-844-7207

Cell: 334-321-7754

hoerrfj@vetmed.auburn.edu