



Association of American Veterinary Medical Colleges

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Veterinarians: Integral Partners in Public Health

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This paper was developed at the request of U.S. Senate staffers to show how veterinarians are involved in public health issues including specific past and present examples. This paper can be used to inform and educate public policy makers about the need for more teaching, research, and laboratory infrastructure at veterinary colleges to be able to graduate more veterinarians in public health, public practice, and biomedical research. A one-page summary of this paper is also available.

Summary

Veterinarians and veterinary medical colleges combine to produce the only professionals trained to link animal diseases, human diseases, food-safety, and bioterrorism agents. Six of the seven Centers for Disease Control and Prevention Critical Biological Agents “Category A” diseases are diseases common to both animals and humans. All veterinarians take an oath that includes the professional responsibility for **using their scientific knowledge and skills to benefit society, promote public health, and advance medical knowledge**. The Institute of Medicine defines public health as “*what we, as a society, do collectively to assure the conditions in which people can be healthy.*”

The 86,000 U.S. veterinarians would not fill a large football stadium. Veterinarians working in private practice, state and federal government, wildlife programs, zoos, research, the military and private industry and organizations are involved in public health activities on a daily basis. There is an acute need for veterinarians in the public health workforce. Public health veterinarians play an important role in the investigation, diagnosis, prevention and control of infectious diseases in local, state and federal governments, research institutions and other venues, holding high level positions as State Epidemiologists, Division, Branch, and Section managers. In addition, the unique set of skills possessed by public health veterinarians have also proved valuable in the non-infectious disease realms of public health, with some specializing in chronic disease epidemiology, environmental health/toxicology, injury prevention/control, occupational health, and various other areas. There is a shortage of 1,500 veterinarians in federal and state government positions fulfilling public health responsibilities. In addition, there is a shortage of 500 food animal private practitioners which is increasing every year. A large percentage of government public health and private food animal veterinarians will retire in the next few years—the next generation is urgently needed.

There are 28 U.S. colleges of veterinary medicine in 26 states which graduate about 2,600 veterinarians annually. All are at full capacity with applicants outnumbering seats

three to one. These colleges are funded largely by the states. The U.S. Census Bureau says that by 2025 the human population will increase 15%. Historically, animal populations increase proportionally. The identified veterinary shortage and projected increased needs in public health indicate that in 20 years, there will be a shortage of 15,000 veterinarians. To meet this demand for more veterinarians, a 20% expansion of enrollment and additional facilities at current institutions are needed. This requires new legislation.

A National Directive and Call for Action

On January 30, 2004, President Bush proclaimed Homeland Security Presidential Directive 9* (HSPD9) that establishes a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies. The Directive finds U.S. agriculture and food systems vulnerable to diseases, pests, or poisonous agents that occur naturally, are unintentionally introduced, or are intentionally delivered by acts of terrorism. The President, in paragraph 20 of HSPD9, directs the Secretaries of Homeland Security, Agriculture, and Health and Human Services, **to support higher education and provide capacity-building grants to colleges of veterinary medicine for training in exotic animal diseases, and public health.** These programs and funds are needed to protect the food supply; support programs that combine food sciences, medicine, veterinary medicine, epidemiology, and microbiology. HSPD9 also calls for the training in food protection and post-graduate opportunities to meet homeland security workforce needs. The Directive, in paragraph 24, specifically calls for safe, secure, state-of-the-art biocontainment laboratories for expanding research and diagnostic capabilities for foreign animal and zoonotic diseases. This requires new legislation.

In response to President Bush's directive, the Association of American Veterinary Medical Colleges surveyed the veterinary medical colleges, departments of veterinary science, and departments of comparative medicine in the U.S. In order to fulfill the presidential directive and graduate 20% more veterinarians to meet society's needs, the colleges and departments require 323,817 square feet of new and renovated classrooms, 260,364 square feet of new and renovated office space, 535,662 square feet of new and renovated teaching laboratory space, 1,138,156 square feet of new and renovated research laboratory space, 192,001 square feet of new and renovated Biosafety level-3 laboratory space, and 504,380 square feet of new and renovated Biosafety level-3 animal holding space.

Veterinarians' Expertise in Providing Public Health Service

Public health services must respond immediately to natural or man-made diseases or terrorism. They must also work on chronic disease issues and conduct long-term research on new preventive vaccines or pharmaceuticals. Because of their unique training, veterinarians are key players in public health activities. **Private practitioners and wildlife veterinarians, tending to individual patients, large herds or flocks, are a first line of defense for foreign animal diseases or bioterrorism agents.**

Veterinarians engaged in food supply practice, from farm to table, are involved in the earliest phases of the food production chain and public health. The food chain production extends from farm to table. It begins with the veterinarian consulting with producers concerning animal husbandry and care of the animals; transport to and through the slaughterhouse; and on to the manufacture, shipping, and sale of food; ending up on the consumer's table. These stages require knowledge of normal food animals, acceptable food animal production methods, disease diagnoses, proper use of pharmaceuticals and other treatments, proper and humane slaughter procedures, food handling and food safety. Five hundred new veterinarians will need to enter the profession annually to satisfy projected needs in food animal veterinary practice.

Veterinarians, working in private practice and in government, protect our citizens by: reporting and responding to suspicions of new and emerging diseases; providing expertise in bio-and-agro-terrorism surveillance; conducting disease prevention programs; developing and implementing food safety activities; monitoring antibiotic residues; adding scientific expertise to protect ecosystems and environments; and working with other medical professionals in basic and applied research. Veterinarians advise physicians, emergency rooms, legislators, local officials, schools, health departments, and the public on disease prevention control of diseases that humans can get from animals and animal products.

The 2,670 federally employed veterinarians work on public health issues. The most recent figures show that there are 100 veterinarians in the U.S. Public Health Service, 98 in the Food and Drug Administration, 85 at the National Institutes of Health, 94 at the Centers for Disease Control and Prevention, 20 with the Environmental Protection Agency, 90 in the U.S. Air Force, 439 in the U.S. Army, 28 in the Department of the Interior, and 1,814 with the U.S. Department of Agriculture. One USDA agency, the Food Safety and Inspection Service, with its crucial public health mission, is currently short of 100 veterinarians and a deficit of 200 is projected in the next five years.

Economic Disaster of Foreign Animal Disease Outbreaks

Foreign animal disease outbreaks in the U.S. can be devastating to human health, animal health, and the national economy depending upon which disease occurs. Foot and Mouth Disease (FMD) is probably the most contagious of all animal diseases. Since FMD does not affect humans, its consequences are only economic, yet an outbreak can still have devastating consequences. FMD attacks all cloven-hoofed animals including cattle, sheep, goats, pigs, camels, deer, elk, moose and bison. The probability of occurrence of an FMD outbreak has changed in recent years, since new potential routes of entry have developed. There is an increased risk of introduction from travelers coming from countries with FMD, smuggling of infected animal products by such travelers, disposal of garbage transported in planes and ships, and from eco-terrorism.

Purdue University and the USDA, Animal and Plant Health Inspection Service estimated the potential revenue impacts of an outbreak of FMD in the U.S. similar to the outbreak in the United Kingdom in 2001. Results showed that the potential loss from removal of livestock would be devastating to the individual producers with a decline in U.S. farm

income of <1%. The larger impacts were from the loss of export markets and consumer fears. Adding export losses plus consumer fears to the farm loss resulted in a 9.5% revenue loss due to FMD. In dollar terms this would result in an estimated decrease of \$14 billion with each sector estimated to lose the following percentage in gross revenue: live swine, -34%; pork, -24%; live cattle, -17%; beef, -20%; milk, -16%; live lambs and sheep, -14%; lamb and sheep meat, -10%; forage, -15%, and soybean meal, -7%. The additional cost of a FMD outbreak to captive deer and elk and also to wildlife was not calculated for this project.

In this scenario veterinarians are a key component in the prevention and immediate detection and response should FMD occur in the U.S. As the first line of defense, food supply veterinarians may be called upon to examine sick animals, impose quarantines, oversee proper disposal of animal carcasses, and reduce the rapid spread of the disease. Veterinary epidemiologists would take the lead in developing strategies that would enable foreign buyers to regionalize the U.S. on the basis of risk posed by an outbreak, thus minimizing the effects on exports of livestock and livestock products. Veterinarians would play a leading role in public health by raising public awareness that the risk of transmitting FMD to humans through the consumption of red meat and dairy products is negligible. Preventing an adverse consumer reaction would decrease negative impacts on revenue by half.

Appendices

Appendix I contains examples of contributions veterinarians have made to society.

Appendix II contains abstracts from published papers on the roles of veterinarians and the national need for unique veterinary medical expertise.

*Appendix III is the entire Homeland Security Presidential Directive 9

HMC: 01/08/07

Examples of Veterinarians Serving Public Health

There are thousands of examples of specific disease outbreaks, public health research, and public service positions in which veterinarians play a key role. Here is a very small list of some of them.

High Levels of Public Service

Acting Surgeon General of the United States—Dr. Robert A. Whitney, a veterinarian held this position in 1993. Prior to this assignment Dr. Whitney held several positions of high level responsibility in the National Institutes of Health including director of the NIH National Center for Research Resources.

Assistant Surgeon General of the United States, Emerging and Re-emerging Diseases, Bioterrorism, Bioengineered Food, Avian Flu—Dr. Roscoe M. Moore, a veterinarian and Assistant Surgeon General, Rear Admiral of the United States Public Health Service Corps, began his distinguished public health career as a veterinarian with the National Institutes of Health (NIH) in 1970. His international experience in public health includes professional activities in Sub-Saharan Africa, Yugoslavia, Poland, Mexico, Croatia, and Canada. Dr. Moore is a world-renowned expert in epidemiology and has been involved in the surveillance of emerging and re-emerging diseases worldwide as well as bioterrorism issues, and the safety of bioengineered food. He has served as the Associate Director for Development Support and African Affairs for the Department of Health and Human Services (HHS) and was the principal liaison between HHS and ministries of health for 53 countries in Africa, focusing on developing infrastructure and technical support to deliver preventive and curative human health needs for the continent. Dr. Moore is also involved in helping guide business planning and response to avian flu.

Assistant Surgeon General of the United States—Dr. Michael T. Blackwell, a veterinarian, Assistant Surgeon General, Rear Admiral of the United States Public Health Service Corps and Dean of the College of Veterinary Medicine at the University of Tennessee has spent more than 22 years in national public health policy development and implementation. Dr. Blackwell has served in private practice, FDA's Center for Veterinary Medicine, the Public Health Service, and as an advisor for all U.S. surgeons general from C. Everett Koop to David Satcher, becoming chief of staff of the Office of the Surgeon General.

FDA Assistant Commissioner for Science and Coordinator for Commissioned Corps Affairs at FDA and Director of FDA's Offices of Women's Health (OWH) and Orphan Products Development—Veterinarian RADM Linda Tollefson. FDA's OWH serves as a champion for women's health both within and outside the agency. The OWH ensures that FDA functions, both regulatory and oversight, and remains gender sensitive and responsive. OWH works to correct any identified gender disparities in drug, device

and biologics testing, and regulation policy. OWH promotes women's health objectives, monitors progress of priority of women's health initiatives within FDA, and promotes an integrative and interactive approach regarding women's health issues across all the organizational components of the FDA.

Director, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, CDC—Veterinarian Dr. Lonnie J. King. The Center maximizes public health and safety nationally and internationally through the prevention and control of disease, disability, and death caused by zoonotic, vector-borne, food borne, waterborne, mycotic, and related infections.

Administrator of USDA, Food Safety Inspection Service—Veterinarian Dr. Barbara Masters. The Food Safety and Inspection Service is the public health agency in the United States Department of Agriculture responsible for ensuring that the nation's commercial supply of meat and egg products is safe, wholesome, and correctly labeled and packaged.

Administrator of USDA, Animal and Plant Health Inspection Service (APHIS)—Veterinarian Dr. Ron DeHaven. APHIS serves an integral part of USDA's efforts to provide the Nation with safe and affordable food. If APHIS was not on the job as the first line of defense, 24 hours a day, 7 days a week, animal diseases like foot-and-mouth disease and bovine spongiform encephalopathy (BSE) (mad cow disease) could devastate our livestock and our food supply. Dr. DeHaven was the leader and chief spokesperson during the BSE case in the United States. His knowledge of the issue, credibility, communications skills and public health background kept a very volatile situation calm and as a result the citizens were kept informed and the livestock industry did not go through a devastating economic turn.

1996 Nobel Prize in Physiology or Medicine—Dr. Peter Doherty, veterinarian researcher at St. Jude Children's Research Hospital in Memphis, Tennessee, was awarded the Nobel Prize for discovery of the process by which the immune system recognizes virus-infected cells which led to advances in efforts to bolster the immune system's defensive response to invading microorganisms and certain types of cancer.

Astronaut and Researcher—Dr. Richard M. Linnehan, a veterinarian, conducted experiments on the effects of full microgravity studies on the brain and nervous system during his space missions and he served as an experimental subject for 26 individual life science experiments.

County of Los Angeles, Department of Health Services—"It is good to hear that the Association of American Veterinary Medical Colleges is working on a bill that might lead to more veterinarians entering public practice. With most emerging infections being zoonotic, the need for public health veterinarians is increasing. However, in recent years, the number of veterinarians interested in public practice has declined. Within our program, we had a difficult time recruiting for two key veterinary positions, bioterrorism and zoonoses. It took over two years to fill these positions due to a complete lack of

applicants. Through persistence, I was finally able to recruit two local small animal veterinarians. I certainly hope that your efforts will lead to a greater pool of public health veterinarians and result in easier recruiting in the future. Feel free to give any committee staffers my contact information. I would be happy to educate them regarding the role public health veterinarians play....I would like to give you a few examples of our positive impact: We participate in local West Nile Virus surveillance, we educate local bird owners about how they can protect their birds from getting avian influenza, we take steps to reduce transmission when investigating animal disease outbreaks, much of what we do is to prepare if the unthinkable happens...deal with animals in the event of a disaster, monitoring for animal disease outbreaks that might indicate a bioterrorist attack or the introduction of a new disease....I could go on and on about the importance of veterinarians in public practice, but I will stop here. I hope I gave you enough to convince the staffers to back the bill.”—*Karen Ehnert, DVM, MPVM, Senior Veterinarian*, November 20, 2006

Bioterrorism, Terrorism, Biothreats, and Biodefense

Bioterrorism, Ebola—*Colonel Donald L. Noah's* career as a **veterinarian** and foreign animal disease diagnostician has taken him around the world. He is an international expert on protecting animals and humans against biological terrorism. In 1995, Zaire (now the Democratic Republic of the Congo) recognized Dr. Noah for his accomplishments during an Ebola hemorrhagic fever outbreak in that country.

Terrorism Prevention at High Profile Gatherings—*Dr. Tracee A. Treadwell*, a **veterinarian** and Captain in the USPHS, is a recognized leader in public health surveillance and in preventing terrorism at high profile gatherings. She has served as the lead for surveillance and epidemiology at the World Trade Organization Ministerial, the Democratic and Republican National Conventions, the Superbowl, the World Trade Center, the World Series, and the Olympics.

Anthrax, Biothreats, and Biodefense—*Dr. Kimothy Smith* is currently Chief **Veterinarian**, Deputy Chief Medical Officer, Department of Homeland Security. Dr. Smith curated the worldwide anthrax collection and managed the Special Pathogens laboratory under the direction of Dr. Martin Hugh-Jones at Louisiana State University. He actively engaged in research execution and program development in the areas of infectious disease ecology, developing molecular typing methods and the application of molecular epidemiological techniques to forensic investigations. In 2002 he became group leader in the Biodefense Division in support of the Chemical and Biological national Security Program at the Lawrence Livermore national Laboratory where he also became Senior Laboratory Manager for the laboratory's deployable environmental biothreat agent monitoring assets and later administered and managed the portfolio of biodefense research projects. *Dr. Martin Hugh-Jones*, a **veterinarian** and professor of epidemiology at Louisiana State University School of Veterinary Medicine, has built and maintained one of the largest anthrax databases in existence today used to identify anthrax samples used in bioterrorist attacks. In 1979, Dr. Hugh-Jones participated in the investigation in Sverdlovsk, a city of the former Soviet Union, when a human anthrax

epidemic broke out. He was also in Russia in 1992 when its government finally admitted that the outbreak was caused by an accidental spore emission from a biological warfare facility. He befriended Russian pathologists involved in the investigation and managed to obtain tissue samples from people infected in the outbreak. *Dr. David A. Ashford*, a **veterinarian** and epidemiologist with the CDC was a prime investigator for the anthrax attacks in the fall of 2001.

Biological Warfare Inspections--*Dr. David Franz*, a **veterinarian** and retired Army Colonel, served as the Chief Inspector on three United Nations Special Commission biological warfare inspection missions to Iraq and as a technical advisor on long-term monitoring. He served as a member of the first two U.S./U.K. teams that visited Russia in support of the Trilateral Joint Statement on Biological Weapons and as a member of the Trilateral Experts' Committee for biological weapons negotiations.

Biological Warfare Defense--*Dr. George Lewis*, a **veterinarian** and retired Army Colonel, commanded the U.S. Army Medical Research Unit in Kuala Lumpur, Malaysia and was also the senior medical Biological Warfare Defense Expert in the Pentagon during Operations Desert Shield and Storm.

Issue Based

Food Safety in Outer Space—*Dr. Norm Heidelbaugh*, a **veterinarian** formally with the military and at Texas A & M was a team member that devised the Hazard Analysis Critical Control Point (HACCP) for astronauts so they would not be at risk for food-borne illnesses while in outer space.

Environmental Hazards and Health Effects—*Drs. Carol Rubin, Walter Daley, and Douglas Sharpnack*, **veterinarians** at the CDC, work in areas of chemicals; disinfectants; and pharmaceuticals in drinking water; exposures to pesticides and toxins; exposure to excessive noise, heat, and cold; cancer clusters; chronic diseases associated with environmental, chemical, and physical agents.

Maternal Health and Infant Health—*Dr. Suzanne Zane*, a **veterinarian** and maternal health epidemiologist at CDC, conducts national surveillance for deaths related to pregnancy, plans national research agenda on maternal morbidity, and conducts research on unintended pregnancies.

Infant and Childhood Immunizations—*Dr. Kristine Bisgard*, a **veterinarian** and medical epidemiologist with the CDC, works with pertussis, diphtheria, and *Haemophilus influenzae* diseases. She has edited, co-written, and published guidelines for the control of pertussis outbreaks, monitored contracts to develop new pertussis serologic reagents, and conducted studies in Russia including case control studies of the effectiveness of vaccines.

Predicting Osteoarthritis—*Drs. James “Jimi” Cook and Dr. Aaron Stoker*, both **veterinarians** at the University of Missouri, are using the dog as the model to research genetics to find a practical clinical ways of predicting osteoarthritis in humans.

Inflammatory Bowel Disease (IBD)—*Dr. Linda Mansfield*, a **veterinarian** and parasitologist at Michigan State University, has developed a mouse model of IBD that is initiated when the mice ingest food borne pathogens. Human immune systems require exposure to infections early in life to develop sufficiently. This research is looking at applications for auto-immune conditions such as asthma, diabetes, and multiple sclerosis.

Alzheimer’s Disease—*Dr. Danielle Gunn-Moore*, a **veterinarian** and researcher, has identified a protein accumulating in the nerve cells of cats’ brains causing mental deterioration, the same protein that creates tangles inside human nerve cells, inhibiting messages being processed by the brain. She is using this finding to investigate new avenues for a cure.

Zoonoses

Avian Influenza (AI)—*Dr. Nikos Gurfield*, San Diego County **Veterinarian**, monitors the Pacific flyway for H5NI AI. *Dr. Bruce Rideout*, **veterinarian** and Head of the Wildlife Disease Laboratory, San Diego Zoological Society, monitors AI and other zoonoses in exotic birds and animals at the Zoological Society of San Diego. *Dr. Sam Yingst*, **veterinarian** with the U.S. Navy Medical Research Unit, monitors the Eastern European flyway through Egypt and Africa for H5NI AI and recently reported H5NI AI in cats in northern Iraq. Veterinarians in Virginia in 2002 tracked the origin of the H7N2 AI to markets in New York and New Jersey where the virus was found—this led to the culling of more than four million turkeys and chickens by veterinarians.

Brucellosis—Brucellosis is a major zoonotic disease and the control of the disease in agriculture animals is prerequisite for the prevention of this disease in human beings. *Brucella melitensis* was declared by the CDC to be one of three major bioterrorist agents. *Drs. Jack Rhyan, Steve Olsen, L. Garry Adams, Keith Aune, Brett Marsh, Rick Willer, Phil Mamer*, all **veterinarians**, convened a working symposium to identify research needs and costs for the development of brucellosis vaccines and diagnostics to address this nidus of chronic zoonotic infection in elk and bison in the Greater Yellowstone area. *Dr. Gary A. Splitter*, a **veterinarian** at the University of Wisconsin-Madison studies current understanding and future approaches to vaccine development for animals and humans including studying host immunity for the development of genetically defined efficient vaccine strains. *Dr. Dean Gerhardt Schurig*, **veterinarian** and Dean, Veterinary-Maryland Regional College of Veterinary Medicine, is the developer of the strain RB51 vaccine.

2006 *E. coli* contamination of spinach in California that sickened 204 people in 26 states and one Canadian province, and left three people dead—This resulted in \$1,000,000 loss sales per day to the spinach industry with a total loss of greater than \$75 million. *Dr. Kevin Reilly*, a **veterinarian** and deputy director of the preventive services

division for the California Department of Health Services headed up the epidemiological investigation. *Dr. Michelle Jay-Russell*, a **veterinarian** and graduate student with the Western Institute for Food Safety and Security and an employee of the California Department for Health Services identified wild boar/pigs as the potential source of *E. coli* in the spinach fields.

2004 *Listeria monocytogenes* Outbreak in Humus—*Dr. John Kaneene*, a **veterinarian** and epidemiologist at Michigan State University was responsible for the surveillance activities

2001 *E. coli* in Hamburger—*Dr. John Kaneene*, **veterinarian** and epidemiologist at Michigan State University was responsible for the surveillance activities.

HIV, AIDS—*Dr. Stacie Greby*, a **veterinarian** and CDC epidemiologist, monitors HIV CDC prevention services including approximately 2.3 million tests per year in 11,000 facilities and assesses referral of HIV+ individuals from HIV prevention settings to HIV care.

Tuberculosis—One-third of the planet's population is infected with TB, and it is one of the top five killers of humankind killing about 2 million people each year. TB in cattle and TB in humans are zoonotic diseases of immense proportions. State and federal veterinarians work on TB epidemiology, surveillance and prevention. *Dr. Adel Talaat*, a **veterinarian** at the School of Veterinary Medicine, University of Wisconsin-Madison, has identified that the TB pathogens activate at all stage of the infection which has resulted in a much more targeted and effective vaccine.

1999 West Nile Virus First Found in the U.S.—**Veterinarians** *Dr. Tracey McNamara* at the Bronx Zoo and *Dr. Millicent Eidson* at the New York State Health Department. Dr. McNamara was aware of the human cases of encephalitis that were reported in the newspapers. When birds at the zoo became sick and died she performed necropsies on them and found their pathologies to be remarkably similar to those reported in the human cases.

Monkeypox—*Dr. James Kazmierczak*, a **veterinarian** with the Wisconsin Division of Public Health, was the first state public health official in 2003 notified about the index case of monkeypox in humans and the first to make the association with prairie dog exposure as subsequent cases occurred. *Dr. Jennifer McQuiston*, a **veterinarian** and commissioned officer in the USPHS coordinated the animal tracing and quarantine in the 2003 outbreak.

Rabies—*Dr. Jorge Hernandez*, a **veterinarian** and clinical epidemiologist at the University of Florida travels to the Yucatan peninsula to participate in a national week for rabies vaccination. This program develops an awareness of the impact that veterinary medicine has on the health and well-being of people and animals in foreign countries.

Smallpox Brief: Dec 15, 2003, California Department of Health Service--

...California and the rest of the nation still face major concerns, including: an impending shortage of trained professionals in the public health workforce. “This report confirms that our smallpox and other emergency preparedness efforts have improved our ability to respond to a bioterrorism event or other large scale public health emergencies, but the report also makes clear that there is continued work to be done to face both manmade and natural health disasters,” said *Dr. Kevin Reilly*, **Veterinarian** and Deputy Director of Preventive Services.

Ebola--*Colonels Jerry Jaax and Nancy Jaax* are both **veterinarians** who are leading experts on bioterrorism who have been on the front lines of the fight against Ebola, anthrax, Congo fever, and other deadly viruses that exist around the globe. Their research and field work have helped to develop medical defenses against chemical and biological agents. Jerry Jaax led a team of space-suited army soldiers into the hot zone in a quarantine facility in Reston, Virginia in 1989 where a lethal virus broke out among imported monkeys. America faced an outbreak of the highly contagious Ebola virus, which kills by massive internal hemorrhage and is capable of jumping from one species to another. Nancy Jaax conducted emergency autopsies on the monkeys to determine the cause of their deaths at the U.S. Army Medical Research Institute of Infectious Diseases. Their work in 1989 with the Reston Ebola outbreak was detailed in Richard Preston’s best-selling book, *The Hot Zone*, and inspired the film *Outbreak*, starring Dustin Hoffman.

Polio—*Dr. Daniel Elmore Salmon*, a **veterinarian** and pathologist, became the founding director of the Bureau of Agriculture under the Department of Agriculture, the precursor of the Bureau of Animal Industry. He inaugurated a nationwide system for meat inspection and quarantine requirement for imported livestock, and for the inspection of exported cattle and the ships with which they were transported. Dr. Salmon and Dr. Theobald Smith made an epoch-making discovery which, today, is still saving children from death or crippling disease. During the study of hog cholera they demonstrated that heat killed organisms could immunize animals against living organisms. This was the foundation for the development of a vaccine against typhus and Jonas Salk’s production of polio vaccine.

Malaria—*Drs. Roberto Docampo and Silvia Moreno*, both **veterinarians** at the University of Illinois led a team of researchers at the Venezuelan Institute for Scientific Research in Caracas and the London School of Hygiene and Tropical Medicine in finding that drugs already approved to treat osteoporosis have potent anti-parasitic activity offering a new approach to the treatment of malaria, sleeping sickness, and AIDS-related infections.

Bubonic Plague—*Dr. Paul Ettestad*, a **veterinarian** with the New Mexico Department of Public Health was the lead epidemiologist who determined in November 2002 that two people who became ill in New York City with bubonic plague contracted the disease from a natural exposure to rodents near their home in New Mexico and that this was not a case of bioterrorism in New York City.

Kuru and Scrapie—*Dr. William Hadlow*, a **veterinarian** and pathologist, linked the similar aspects of scrapie in sheep with those of kuru in humans. Today, it is increasingly clear that the scrapie disease agent has important similarities to bovine spongiform encephalopathy (BSE, mad cow disease) in cattle which, in turn, is linked by some investigators to the emergence of the deadly variant of Creutzfeld-Jacob Disease in humans.

Chronic Wasting Disease (CWD)—*Dr. Edward Hoover*, a **veterinarian** at the Colorado research center in Ft. Collins, investigates the mechanics of CWD infection in deer and elk, especially the immune system's lymphoid tissues. Such studies underlie the search for improved diagnostics and therapies and seek to better understand the entire spectrum of disease transmission and what circumstances CWD might "jump" to other species.

Rift Valley Fever (RVF)—*Drs. Shinji Makino and John C. Morrill*, **veterinarians** and researchers at the University of Texas Medical Branch at Galveston, researched a safe live human vaccine for mass inoculation of humans against this Category A bioterrorism agent.

Onchocerciasis or "River Blindness"—*Drs. Jeff Williams and Hashim Ghalib*, **veterinarians** at Michigan State University used animal deworming products in the Sudan along the Nile River to treat humans for "River Blindness." Nearly all adults over the age of 35 were blind, now there is essentially no "River Blindness" in Africa.

HMC:01/23/07

Preventing Zoonotic Diseases in Immunocompromised Persons: The Role of Physicians and Veterinarians

Sara Grant and Christopher W. Olsen, University of Wisconsin, Madison

Dr. Grant is a staff veterinarian at the New Haven Central Hospital for Veterinary Medicine in New Haven, CT. Dr. Olsen is an assistant professor of public health at the University of Wisconsin School of Veterinary Medicine.

Abstracted from *Emerging Infectious Diseases*, Jan-Mar 1999

Physicians and veterinarians in Wisconsin were surveyed about the risk for and prevention of zoonotic diseases in compromised persons. Physicians believe that veterinarians should be involved in many aspects of zoonotic disease prevention, including patient education.

Pet ownership poses health risks through the zoonotic transmission of infectious diseases, especially in the immunocompromised. Since human medicine often does not delve deeply into the role of animals in the transmission of zoonotic agents and veterinary medicine does not cover the clinical aspects of human disease, zoonotic disease control requires involvement of both physicians and veterinarians.

The survey results indicate that veterinarians encounter zoonotic diseases in their practices or discuss them with their clients more frequently than physicians. Physicians were asked how comfortable they felt about advising patients on the role of animals in the transmission of zoonotic agents and associated risks. They responded that they were not very comfortable in this role; moreover, physicians indicated that veterinarians should play an equal or greater role in advising patients about zoonotic diseases. In particular they suggested that veterinarians should be involved not only in controlling zoonotic disease pathogens in animals, but also in providing information for patients and physicians.

The survey results suggest that communication between physicians and veterinarians about zoonotic diseases is largely absent. Enhancing such communication could help prevent transmission of zoonotic agents. In addition to directly contacting veterinary practitioners in their community, physicians can also contact their state health departments for information, since some health departments have public health veterinarians on staff. Links between the professions on a broader scale to foster a broader consensus about zoonotic disease risks and prevention should also be encouraged.

Confronting Zoonoses, Linking Human and Veterinary Medicine *Laura H. Kahn, M.D., Princeton University, Princeton, NJ*

Dr. Kahn is a general internist and a member of the research staff in the Program on Science and Global Security in the Woodrow Wilson School of Public and International Affairs, Princeton University. Her research interests include public health policy and emergency preparedness.

Abstracted from *Emerging Infectious Diseases*, April 2006

Many of the emerging infectious diseases, including those caused by bioterrorist agents, are zoonoses. Since zoonoses can infect both animals and humans, the medical and veterinary communities should work closely together in clinical, public health, and research settings. These efforts would increase our understanding of how zoonoses expand their host range and would, ultimately, improve prevention and control strategies.

Closer collaborations are needed between veterinarians, physicians, and public health professionals in 3 areas: individual health, population health, and comparative medicine research. In individual health setting, assessing the potential for zoonotic disease transmission from animals to humans should include input from both physicians and veterinarians, especially for patients at high risk such as those who are immunocompromised. In population health, zoonotic disease threats should be addressed through surveillance systems that include domestic and wild animal and human populations, which would help lead to effective control measures. In research setting, collaboration between physicians and veterinarians in comparative medicine would improve our understanding of zoonotic agent-host interactions.

The decline in veterinarian-scientists is dire. A 2004 National Academy of Sciences (NAS) report found that of American Veterinary Medical Association members, <1% were board certified in laboratory animal medicine and <2% were board certified in pathology. In addition, the total number of veterinarians who receive NIH grant funding is small. In 2001, only 4.7% of all NIH grants funded for animal research were awarded to veterinarian principal investigators. The shift in veterinary schools from comparative medicine research and livestock medicine to companion animal medicine to meet societal demands has discouraged many veterinary students from pursuing careers in research and hinders research on emerging zoonoses from diverse animal hosts.

**Veterinarians in Population Health and Public Practice:
Meeting Critical National Needs (White Paper)**

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Abstracted from *the Journal of Veterinary Medical Education*, 30(3) 2003

The Association of American Veterinary Medical Colleges (AAVMC) recognizes that its member colleges and departments are at a critical decision point, as is the veterinary profession itself. The outcome of decisions made now may well determine the future of the profession and its contribution to the nation's welfare. Resources, including the infrastructure available to support educational programs, are limited, and without careful and informed decisions at several levels, opportunities to benefit both society and the veterinary profession will be lost.

Over the last half-century, as our society has changed, veterinary medicine and its educational institutions have, to a great extent, reflected this change. Critical national needs in public health, food safety and security, animal health, and comparative medicine continue to increase at an alarming rate. These needs can most effectively be addressed by veterinarians with expertise in population health and public practice. Veterinarians are a unique national resource, as they are the only health professionals trained in multispecies comparative medicine.

Currently, approximately 20% (15,000) of all veterinarians in the U.S. are engaged in either private population-health practice with a significant food animal component or public practice in one of its various forms. Satisfying only current needs in population health and public practice will require more than 500 of the approximately 2,500 available new U.S. graduates each year. If new graduates do not enter these fields, government, non-governmental organizations, industry, and agribusiness will employ either foreign-trained veterinarians or non-veterinarians to fill their needs.

Issues such as food safety and public health are not merely the concern of individual states but are of national, and even global, importance. Therefore, they may be most appropriately addressed by a collective partnership among the veterinary medical colleges, departments of veterinary science, departments of comparative medicine, and the federal, as well as all state governments. Further strategic development of the veterinary medical educational infrastructure and resources, together with shared responsibility and accountability, will benefit all Americans and optimize the national efforts required to meet challenges in public health, food safety and security, animal health, and comparative medicine.

Veterinary medical colleges and the graduates they produce are a unique national resource, whose full potential remains unrealized. New opportunities and challenges, given that resources are limited, will require further adaptation. Not only are the

resources available for education limited; the overall number of veterinarians is limited and there are shortages of veterinarians in several critical areas of professional expertise.

While the future is defined by uncertainty, there will continue to be many needs that can best be met by veterinarians trained in population health and public practice. If food safety and security and public health in the U.S. are to continue to meet the highest standards, issues of emerging and re-emerging animal and zoonotic diseases must continue to receive the profession's greatest attention. The impact of veterinary medicine and the veterinary academy on national security, the national economy, and international trade is also far reaching. For example, all Category A threat agents, with the exception of smallpox, and all Category B threat agents are zoonotic. These challenges, combined with the facts that veterinarians are the only health professionals trained in multispecies medicine, present an unparalleled opportunity to provide a bridge between agriculture and human medicine.

If steady-state level of employment is assumed, projected needs for public-sector population health veterinarians is relatively uncomplicated. For example, several federal agencies face impending staff shortages. The average age for USDA Food Safety and Inspection Service (FSIS) veterinarians is 54; USDA in the next five years. Approximately half of the veterinarians in the Commissioned Corps of the United States Public Health Service (USPHS) are currently eligible for retirement. To maintain its current effective strength, the U.S. Army Veterinary Corps requires an addition of 45 new veterinarians each year.

Satisfying current projected needs in traditional population health areas of public practice and private practice with a food animal component will require over 500 new entries annually. Available data indicate that approximately 50% of all new graduates initially entering food animal practice exit within five years. Therefore it is likely these projected needs are conservative. In all probability veterinarians leaving food animal practice will move into another veterinary profession pathway. So to maintain the current position, more than 20% of new graduates must initially enter population health or public practice upon graduation.

National Action to Meet a National Agenda

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Abstracted from the *Journal of Veterinary Medical Education*, 30(2) 2003

The United States and other nations are facing significant and immediate biological and health threats, which the training of veterinarians makes them ideally suited to respond to and help counter—but prompt and sustained action by the profession and its leadership is required. Equally important, those in positions of leadership in the U.S. must recognize and nurture this capability of the veterinary profession, as it is a precious and crucial national resource. The U.S. is facing two kinds of biological threats, those of natural origin and those deliberately initiated. The consequence of both kinds of threats can be devastating, whether affecting human health, animal health, food safety, agriculture, or food production and supply. Our vulnerability in each of these areas and, in consequence, our need for intensive response are very considerable. The U.S. is facing threats of ever-increasing complexity, especially in the area of new, emerging, and re-emerging infectious diseases. We are at a risk with respect to many aggressive pathogens, many with the potential for overwhelmingly destructive consequences, and the risk to animals, humans, and the nation's food supply continues to grow.

We have witnessed the subtle invasion of the epidemic of bovine spongiform encephalopathy (BSE) and the subsequent discovery of variant Creutzfeldt-Jakob disease in the United Kingdom; the precipitateness of the epidemic of the old foe, food-and-mouth disease, in cattle in the same country; the steady progress of the epidemic of West Nile virus encephalitis in humans and horses across the U.S.; the mysterious epidemic of Nipah virus encephalitis in pigs and humans in southeast Asia; and the epidemic of SARS in China and its fearsome spread globally.

Academic veterinary medicine must take action. Academic veterinary medicine must develop the means to deliver graduates into the many professional careers that contribute to public health, to agricultural security and to the prevention and control of new, emerging, and re-emerging diseases and bioterrorism. Graduates must be delivered to careers in public health, food safety and security, food animal production, and veterinary research. Currently, there is a clear shortage within the profession of those with expertise outside of clinical practice, especially in the area of public health, food safety, food and animal production, biosecurity, and veterinary research, but it is exactly such a cohort of veterinarians, with this range of expertise, who are needed to be at the forefront in the fight against bioterrorism and other biological catastrophes. Academic veterinary medicine must develop the capacity to turn out leaders in all fields of veterinary

medicine, but, especially, leaders in the fields that are at the heart of preventing and controlling new, emerging, and re-emerging diseases and bioterrorism. Academic veterinary medicine must develop a stronger research commitment and a more substantial research base in the various disciplines that contribute to the prevention and control of new, emerging, and re-emerging diseases and bioterrorism. Success in meeting these threats requires that there be a strong research underpinning in each and every essential area.

Financial resources, however, are critically required to create a veterinary workforce in biosecurity and related areas. New funding is essential to build new opportunities into veterinary professional curricula, into graduate curricula, and into related clinical and work experiences. The 27 schools of veterinary medicine in the U.S. and their educational programs are funded very largely by the 26 states in which they are located. These schools and colleges must continue to sustain the workforce essential for providing health care to all animals and animal populations. To meet and sustain the national agenda for biosecurity and, especially, to increase student enrollments in the veterinary schools in order to provide and sustain this workforce, funding must go beyond that provided by the individual states. National financial resources, matching these national needs, are essential.

Biological Terrorism against Animals and Humans: A Brief Review and Primer for Action

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Abstracted from the *Journal of the American Veterinary Medical Association*, July 1, 2002

With the realization that the threat of bioterrorism was increasing, the Centers for Disease Control and Prevention (CDC) has developed a strategic plan for the response to biological and chemical terrorism. The plan of the CDC outlines 3 categories of biological agents that could or have been used by terrorist groups. The categories are grouped by priority. Category A consists of the highest priority of agents that pose a risk to national security because they can easily be disseminated or transmitted person to person, cause high mortality with potential for major public health impact, might cause public panic and social disruption, and require special action for public health preparedness. All but one of these agents are pathogens common to both animals and humans. Category B consists of the second highest priority of agents because they are moderately easy to disseminate, cause moderate morbidity and low mortality, and require specific enhancements of diagnostic capacity and surveillance activities. These list also contains pathogens that are food or waterborne. Category C agents are those that include emerging pathogens that could be engineered for mass dissemination in the future because of availability, ease of production and dissemination, and potential for high morbidity and mortality and major health impact.

As part of the strategic planning process, CDC and other federal agencies are providing support to state and local health departments through a number of grants to improve epidemiological surveillance, public health information management and communication infrastructure, public health laboratory capability, and public health emergency planning. Throughout the planning documents developed for bioterrorism response, veterinarians are considered a key part of the disease surveillance system. It is vitally important that all facets of veterinary medicine stay involved in the preparations to respond to bioterrorism. This should be obvious by the known or potential zoonotic nature of many diseases in the CDC bioterrorism categories and the recognized potential for expertise, support, and response that veterinarians provide in animal care and in the general response to a bioterrorism attack. Veterinarians have an important role in bioterrorism response preparation, surveillance for potential bioterrorism events, treatment of the ill, and in the control of disease. A recent study by U.S. public health officials concluded that the veterinary education model “which looks at populations rather than individual patients, might serve as a model for the medical community.”

Animal Health Research at the Time of a National Security: Then What?

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Abstracted from the *Science at a Time of National Emergency*, No. 106—June 2002

The biological relationship between animals and humans has never been more intertwined. The persistent outbreaks of diseases such as *Escherichia coli* O157:H7, the malicious spreading of anthrax spores, the emergence of West Nile Virus, and the economic impact of non-zoonotic diseases such as Food and Mouth Disease, have gripped the attention and, in a peculiar way, the lure of the general public and scientific community. These events, coupled with the plethora of other animal diseases that range from cancer to mastitis, have triggered introspection of animal health as it relates to human health, national security, and the national economy. Clearly, there are a number of medical diseases of animals, both infectious and non-infectious, that are vital to: 1) the basic understanding of disease processes that overlap in human and veterinary medicine; 2) the general health and well-being of animals (and potentially humans); and 3) the national economy and bioterrorism. In addition, veterinarians, physicians, and scientists have long been aware of the many nearly identical similarities between diseases and conditions of animals to those of humans. However, animal health issues have been strongly tied with issues of agriculture such as soil science, plant health, food stamps, farm management, waste disposal, etc. This tie, in certain ways, has obscured the view of veterinary medicine and animal health as a close correlate to human medicine and health. Is it time for aspects of veterinary medicine and animal health to be viewed, side-by-side, with human medicine and health?

Maintaining and even expanding research on animal diseases and conditions is prudent for human health, and it is economically savvy. Aligning aspects of veterinary medicine and animal health with the mission of the Department of Health and Human Service (HHS) and the National Institutes of Health (NIH), may be beneficial in revealing subtle connections to human disease processes. Identification of such connections may enhance disease prevention and treatment in both animals and humans.

HMC:12/07/06

Appendix III



For Immediate Release
Office of the Press Secretary
February 3, 2004

Homeland Security Presidential Directive/HSPD-9

Subject: Defense of United States Agriculture and Food
January 30, 2004

Purpose

(1) This directive establishes a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.

Background

(2) The United States agriculture and food systems are vulnerable to disease, pest, or poisonous agents that occur naturally, are unintentionally introduced, or are intentionally delivered by acts of terrorism. America's agriculture and food system is an extensive, open, interconnected, diverse, and complex structure providing potential targets for terrorist attacks. We should provide the best protection possible against a successful attack on the United States agriculture and food system, which could have catastrophic health and economic effects.

Definitions

(3) In this directive:

(a) The term critical infrastructure has the meaning given to that term in section 1016(e) of the USA PATRIOT Act of 2001 (42 U.S.C. 5195c(e)).

(b) The term key resources has the meaning given that term in section 2(9) of the Homeland Security Act of 2002 (6 U.S.C. 101(9)).

(c) The term Federal departments and agencies means those executive departments enumerated in 5 U.S.C. 101, and the Department of Homeland Security; independent establishments as defined by 5 U.S.C. 104(1); Government corporations as defined by 5 U.S.C. 103(1); and the United States Postal Service.

(d) The terms State, and local government, when used in a geographical sense, have the same meanings given to those terms in section 2 of the Homeland Security Act of 2002 (6 U.S.C. 101).

(e) The term Sector-Specific Agency means a Federal department or agency responsible for infrastructure protection activities in a designated critical infrastructure sector or key resources category.

Policy

(4) It is the policy of the United States to protect the agriculture and food system from terrorist attacks, major disasters, and other emergencies by:

(a) identifying and prioritizing sector-critical infrastructure and key resources for establishing protection requirements;

(b) developing awareness and early warning capabilities to recognize threats;

(c) mitigating vulnerabilities at critical production and processing nodes;

(d) enhancing screening procedures for domestic and imported products; and

(e) enhancing response and recovery procedures.

(5) In implementing this directive, Federal departments and agencies will ensure that homeland security programs do not diminish the overall economic security of the United States.

Roles and Responsibilities

(6) As established in Homeland Security Presidential Directive-7 (HSPD-7), the Secretary of Homeland Security is responsible for coordinating the overall national effort to enhance the protection of the critical infrastructure and key resources of the United States. The Secretary of Homeland Security shall serve as the principal Federal official to lead, integrate, and coordinate implementation of efforts among Federal departments and agencies, State and local governments, and the private sector to protect critical infrastructure and key resources. This directive shall be implemented in a manner consistent with HSPD-7.

(7) The Secretaries of Agriculture, Health and Human Services, and the Administrator of the Environmental Protection Agency will perform their responsibilities as Sector-Specific Agencies as delineated in HSPD-7.

Awareness and Warning

(8) The Secretaries of the Interior, Agriculture, Health and Human Services, the Administrator of the Environmental Protection Agency, and the heads of other appropriate Federal departments and agencies shall build upon and expand current monitoring and surveillance programs to:

(a) develop robust, comprehensive, and fully coordinated surveillance and monitoring systems, including international information, for animal disease, plant disease, wildlife disease, food, public health, and water quality that provides early detection and awareness of disease, pest, or poisonous agents;

(b) develop systems that, as appropriate, track specific animals and plants, as well as specific commodities and food; and

(c) develop nationwide laboratory networks for food, veterinary, plant health, and water quality that integrate existing Federal and State laboratory resources, are interconnected, and utilize standardized diagnostic protocols and procedures.

(9) The Attorney General, the Secretary of Homeland Security, and the Director of Central Intelligence, in coordination with the Secretaries of Agriculture, Health and Human Services, and the Administrator of the Environmental Protection Agency, shall develop and enhance intelligence operations and analysis capabilities focusing on the agriculture, food, and water sectors. These intelligence capabilities will include collection and analysis of information concerning threats, delivery systems, and methods that could be directed against these sectors.

(10) The Secretary of Homeland Security shall coordinate with the Secretaries of Agriculture, Health and Human Services, and the Administrator of the Environmental Protection Agency, and the heads of other appropriate Federal departments and agencies to create a new biological threat awareness capacity that will enhance detection and characterization of an attack. This new capacity will build upon the improved and upgraded surveillance systems described in paragraph 8 and integrate and analyze domestic and international surveillance and monitoring data collected from human health, animal health, plant health, food, and water quality systems. The Secretary of Homeland Security will submit a report to me through the Homeland Security Council within 90 days of the date of this directive on specific options for establishing this capability, including recommendations for its organizational location and structure.

Vulnerability Assessments

(11) The Secretaries of Agriculture, Health and Human Services, and Homeland Security shall expand and continue vulnerability assessments of the agriculture and food sectors. These vulnerability assessments should identify requirements of the National Infrastructure Protection Plan developed by the Secretary of Homeland Security, as appropriate, and shall be updated every 2 years.

Mitigation Strategies

(12) The Secretary of Homeland Security and the Attorney General, working with the Secretaries of Agriculture, Health and Human Services, the Administrator of the Environmental Protection Agency, the Director of Central Intelligence, and the heads of other appropriate Federal departments and agencies shall prioritize, develop, and implement, as appropriate, mitigation strategies to protect vulnerable critical nodes of production or processing from the introduction of diseases, pests, or poisonous agents.

(13) The Secretaries of Agriculture, Health and Human Services, and Homeland Security shall build on existing efforts to expand development of common screening and inspection procedures for agriculture and food items entering the United States and to maximize effective domestic inspection activities for food items within the United States.

Response Planning and Recovery

(14) The Secretary of Homeland Security, in coordination with the Secretaries of Agriculture, Health and Human Services, the Attorney General, and the Administrator of the Environmental Protection Agency, will ensure that the combined Federal, State, and local response capabilities are adequate to respond quickly and effectively to a terrorist attack, major disease outbreak, or other disaster affecting the national agriculture or food infrastructure. These activities will be integrated with other national homeland security preparedness activities developed under HSPD-8 on National Preparedness.

(15) The Secretary of Homeland Security, in coordination with the Secretaries of Agriculture, Health and Human Services, the Attorney General, and the Administrator of the Environmental Protection Agency, shall develop a coordinated agriculture and food-specific standardized response plan that will be integrated into the National Response Plan. This plan will ensure a coordinated response to an agriculture or food incident and will delineate the appropriate roles of Federal, State, local, and private sector partners, and will address risk communication for the general public.

(16) The Secretaries of Agriculture and Health and Human Services, in coordination with the Secretary of Homeland Security and the Administrator of the Environmental Protection Agency, shall enhance recovery systems that are able to stabilize agriculture production, the food supply,

and the economy, rapidly remove and effectively dispose of contaminated agriculture and food products or infected plants and animals, and decontaminate premises.

(17) The Secretary of Agriculture shall study and make recommendations to the Homeland Security Council, within 120 days of the date of this directive, for the use of existing, and the creation of new, financial risk management tools encouraging self-protection for agriculture and food enterprises vulnerable to losses due to terrorism.

18) The Secretary of Agriculture, in coordination with the Secretary of Homeland Security, and in consultation with the Secretary of Health and Human Services and the Administrator of the Environmental Protection Agency, shall work with State and local governments and the private sector to develop:

(a) A National Veterinary Stockpile (NVS) containing sufficient amounts of animal vaccine, antiviral, or therapeutic products to appropriately respond to the most damaging animal diseases affecting human health and the economy and that will be capable of deployment within 24 hours of an outbreak. The NVS shall leverage where appropriate the mechanisms and infrastructure that have been developed for the management, storage, and distribution of the Strategic National Stockpile.

(b) A National Plant Disease Recovery System (NPDRS) capable of responding to a high-consequence plant disease with pest control measures and the use of resistant seed varieties within a single growing season to sustain a reasonable level of production for economically important crops. The NPDRS will utilize the genetic resources contained in the U.S. National Plant Germplasm System, as well as the scientific capabilities of the Federal-State-industry agricultural research and extension system. The NPDRS shall include emergency planning for the use of resistant seed varieties and pesticide control measures to prevent, slow, or stop the spread of a high-consequence plant disease, such as wheat smut or soybean rust.

Outreach and Professional Development

(19) The Secretary of Homeland Security, in coordination with the Secretaries of Agriculture, Health and Human Services, and the heads of other appropriate Federal departments and agencies, shall work with appropriate private sector entities to establish an effective information sharing and analysis mechanism for agriculture and food.

(20) The Secretaries of Agriculture and Health and Human Services, in consultation with the Secretaries of Homeland Security and Education, shall support the development of and promote higher education programs for the protection of animal, plant, and public health. To the extent permitted by law and subject to availability of funds, the program will provide capacity building grants to colleges and schools of veterinary medicine, public health, and agriculture that design higher education training programs for veterinarians in exotic animal diseases, epidemiology, and public health as well as new programs in plant diagnosis and treatment.

(21) The Secretaries of Agriculture and Health and Human Services, in consultation with the Secretaries of Homeland Security and Education, shall support the development of and promote a higher education program to address protection of the food supply. To the extent permitted by law and subject to the availability of funds, the program will provide capacity-building grants to universities for interdisciplinary degree programs that combine training in food sciences, agriculture sciences, medicine, veterinary medicine, epidemiology, microbiology, chemistry, engineering, and mathematics (statistical modeling) to prepare food defense professionals.

(22) The Secretaries of Agriculture, Health and Human Services, and Homeland Security shall establish opportunities for professional development and specialized training in agriculture and

food protection, such as internships, fellowships, and other post-graduate opportunities that provide for homeland security professional workforce needs.

Research and Development

(23) The Secretaries of Homeland Security, Agriculture, and Health and Human Services, the Administrator of the Environmental Protection Agency, and the heads of other appropriate Federal departments and agencies, in consultation with the Director of the Office of Science and Technology Policy, will accelerate and expand development of current and new countermeasures against the intentional introduction or natural occurrence of catastrophic animal, plant, and zoonotic diseases. The Secretary of Homeland Security will coordinate these activities. This effort will include countermeasure research and development of new methods for detection, prevention technologies, agent characterization, and dose response relationships for high-consequence agents in the food and the water supply.

(24) The Secretaries of Agriculture and Homeland Security will develop a plan to provide safe, secure, and state-of-the-art agriculture biocontainment laboratories that research and develop diagnostic capabilities for foreign animal and zoonotic diseases.

(25) The Secretary of Homeland Security, in consultation with the Secretaries of Agriculture and Health and Human Services, shall establish university-based centers of excellence in agriculture and food security.

Budget

(26) For all future budgets, the Secretaries of Agriculture, Health and Human Services, and Homeland Security shall submit to the Director of the Office of Management and Budget, concurrent with their budget submissions, an integrated budget plan for defense of the United States food system.

Implementation

(27) Nothing in this directive alters, or impedes the ability to carry out, the authorities of the Federal departments and agencies to perform their responsibilities under law and consistent with applicable legal authorities and Presidential guidance.

(28) This directive is intended only to improve the internal management of the executive branch of the Federal Government, and it is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, against the United States, its departments, agencies, or other entities, its officers or employees, or any other person.

GEORGE W. BUSH

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