

Senator Santorum, thank you for the opportunity to present testimony to the Subcommittee on Research, Nutrition, and General Legislation today on Bio-Security: Is U.S. Agriculture Prepared to Protect Itself? My name is Bob Steele and I am Dean of the College of Agricultural Sciences at Penn State University. I am currently in my 9th year in this position. In addition, I serve in various leadership capacities in the coordinated network of Land Grant University Colleges of Agriculture in partnership with the USDA through the Cooperative State Research, Education and Extension Service (CSREES). As requested, I will limit my remarks to the 7 questions raised and conclude with some general summary comments.

Overview of how Penn State fits within the national structure concerned with agricultural bio-security

Penn State is one of the nation's premier comprehensive research universities and is the Land Grant University for the Commonwealth. Chartered in 1855, it is one of the oldest land grants, awarding the nation's first undergraduate and graduate degrees in agriculture. It is the only university in Pennsylvania offering comprehensive research, education and extension programs across the entire food and fiber spectrum. Our programs reach each of the 67 counties of Pennsylvania and are coordinated with programming in the more than 3,000 counties throughout the United States. This is the essence of the Land Grant University system we've had in place since 1862 and it has been studied and emulated throughout the world. Within the College of Agricultural Sciences, there are approximately 2,500 undergraduate and graduate students pursuing their education with aspirations of becoming some of tomorrow's leaders in these programs in Pennsylvania, throughout the United States and around the globe. Extensive research, education and extension programs centering on agricultural bio-security are coordinated from the college but expertise in this area is located throughout the entire university. The nearly \$160M funding portfolio of the college is drawn from federal, state, local and private sources. All funds are allocated and re-allocated into priority areas based upon comprehensive and ongoing strategic planning activities involving extensive stakeholder input. . There are no entitlements. Organizations such as those present at this hearing (Penn Ag Industries, PA Farm Bureau, PA Department of Agriculture, other universities, and the Penn State Ag Council to name a few) are important avenues for us to reach stakeholders. Specific initiatives Penn State has taken or services it offers to advance bio-security within the agricultural sector

There are too many ongoing activities in bio-security to mention within the limited constraints of this testimony; however, I will describe five specific activities that document our role as well as how we attempt to coordinate and complement our activities with institutions and agencies within PA as well as with other states.

Animal Health: Avian Influenza. The PA Animal Diagnostic Laboratory System (PADLS) within the Commonwealth has become a model nationally for dealing with animal health issues including both prevention and intervention. Comprised of a partnership among Penn State, the PA Department of Agriculture and the University Of PA School Of Veterinary Medicine, each institution brings its unique expertise to bear on animal health issues important to Pennsylvanians. As others on this and other panels I am sure will testify, the issue of avian influenza (AI) is especially relevant. One lesson learned from past AI outbreaks was the need

for better diagnostic tools to more quickly identify viral strains emerging. To develop a better diagnostic requires a more complete understanding of the fundamental biology of the organism, i.e. closing the knowledge gaps, emphasizing the paramount importance of the need for ongoing research, ranging from the very basic to the very applied. The possibility of a highly pathogenic strain of AI arising which can mutate and jump to humans is of course very much in the news today. It should be emphasized that the unintentional (or natural) or the intentional appearance of the virus doesn't matter because the science is the same. An avian virologist at Penn State has developed a novel rapid diagnostic test to identify the particularly dangerous H5 and N7 subtypes in only a few hours rather than the many days it takes for traditional virus isolation tests. During a 2001 outbreak of AI in PA, this test enabled a quick diagnosis helping state officials contain the outbreak and limit the losses to 140,000 birds and about \$350,000 in direct costs. Contrast this to an outbreak of the same virus a few months later in VA which took much longer to diagnose with a different test. The outbreak in VA resulted in producers losing almost 5 million birds at a cost of over \$100 million.

Our researcher has been in Laos and Cambodia with the Food and Agriculture Organization (FAO) of the UN to assist these countries by setting up laboratories to manage avian flu outbreaks there. Working with FAO scientists, our PADLS laboratory system will train them to learn AI diagnostic and surveillance techniques. And finally, scientists at Penn State and elsewhere continue with their research in gaining an even better understanding of basic biological aspects of virology and other animal pathogens so that better prevention and intervention strategies may be developed.

Plum Pox Virus. A few years ago, Pennsylvania experienced an outbreak of Plum Pox virus that seriously impacted the stone fruit industry in PA. With rapid deployment of experts to the field working with the PA Department of Agriculture, we were able to quickly determine the extent of the virus outbreak and contain it through quarantine and removal of infected trees. Using resources largely from PA and leveraging federal funds and expertise, the containment was successful but costly to the producer. It was a good partnering example of the state dealing with its unique problem in ways that it knew best but leveraging federal funds to return to PA to assist. Unfortunately, this outbreak demonstrated how poor our fundamental biological knowledge of this and other plant diseases is since the only remedy offered the producer was the complete removal of infected trees. Again, whether a plant pest or pathogen appears unintentionally or intentionally, the science is the same. These considerable knowledge gaps absolutely must be closed through more research so as to gain a better understanding of the biology of these organisms so that more effective surveillance, prevention and intervention strategies may be developed.

Chemical Ecology and Bio-Sensor Development. Insects, largely through their antennae, are the undisputed masters at detection of minute quantities of signal molecules in the atmosphere and eliciting rapid and appropriate responses to these signals. A Penn State team of scientists in our Center for Chemical Ecology is hard at work to "learn from nature" in developing at the molecular through the organism level a thorough understanding of the biological, physical and social basis underlying these magnificent systems. With this improved understanding, they are making rapid progress in developing sensors that may be used as molecular sentinels deployed in field locations and elsewhere to detect either unintentional or intentional introduction of

chemical/biological agents. It is an exciting example of work at the interface of two pioneering disciplines, biotechnology and nanotechnology, bringing together scientists, and most importantly students (the next generation), from what at first are seemingly unrelated fields to come together to take important inter- and multi-disciplinary approaches. This work also represents a partnership of multiple universities, government agencies (e.g. Defense, NSF, USDA APHIS, etc) and private entities.

Soybean Rust. With the threat of an invasive plant disease such as soybean rust, the USDA developed a national decision support system relying on a computer forecasting service developed by the Penn State College of Agricultural Sciences. The core of this service uses a weather based decision support product that is already beginning to change the way we approach pest and pathogen surveillance, detection and management. The interactive website involves researchers, extension specialists, industry representatives and USDA officials that currently track the development of the soybean crop as well as the disease's progress throughout the United States (www.usda.gov/soybeanrust). This site is likely the largest scale effort of its kind anywhere to date and will in all likelihood become the model that is used for surveillance, detection, and management of the appearance of numerous other pests and pathogens worldwide. It allows state extension specialists to develop recommendations specific for each state since clearly the approach for PA, for example, will likely be quite different than the approach for Mississippi. Again and most importantly, students at the land grant universities are deeply involved as part of their education, research and training to replace us as tomorrow's experts in these critical national interest areas of agricultural bio-security.

The Extension Disaster Education Network (EDEN). As mentioned above, Penn State through its Cooperative Extension activities has a physical and programmatic presence in each of PA's 67 counties that is also linked throughout the more than 3,000 counties nationwide via the Land Grant University Cooperative Extension Service. For decades, emergency preparedness has been a priority area for extension programming. These programs have spanned areas as diverse as natural disasters, animal health, food safety, and emergency readiness to name a few. Within PA, EDEN coordinates with the PA Department of Agriculture, The PA Department of Health, and FEMA and PEMA (federal and state emergency management). Programs developed at Penn State for Ag Emergency Training for first responders have been designated as national programs that are used nationwide. Penn State's Cooperative Extension experts participate on and interact with other federal agencies such as the FBI Agricultural Terrorism Advisory Committee. The national EDEN meeting was hosted by Penn State in 2004. Finally, Penn State has been designated by the CDC as a Center for Public Health Preparedness with emphasis on using zoonotic diseases of significance with wildlife as sentinels.

Areas where additional work would be fruitful for enhanced bio-security

Each of the examples detailed above illustrate the importance of continuing efforts to close knowledge gaps so that we gain better and better understanding of the biological systems we are dealing with. Our ability to develop new diagnostic tools, prevention and intervention strategies becomes quickly limited by these knowledge gaps. Therefore, committing the resources to support the research, education and outreach activities is pretty obvious. In my view, however, the single most important issue is preparation of the workforce needed in this

area. The anthrax episode of a few years ago demonstrated so clearly how poorly prepared we were since there were so few people who had a detailed understanding of anthrax. Many retired scientists were contacted for their expertise since there were so few working scientists in this area. Our ability to attract the best and brightest minds to become educated and work in this area is critical because the issue we are discussing today is indeed a generational one. We will not solve it in a few years! We will be dealing with it for many, many years to come and the issue will continue to grow in complexity. We cannot outsource creativity and innovation in agricultural bio-security. Our best and brightest young people have options and they will pursue areas in which they see opportunity for them to make a difference to society. We need to be able to demonstrate to these young people that this is a high priority area with opportunity for them to build satisfying and rewarding careers. This is the unique role for America's universities and especially, although not exclusively, the Land Grant Universities. This is for the public good so the public must be willing to make this a priority and find the resources to ensure that it happens.

Obstacles that would impede the work proposed

The easy answer to this question is simply to say that we need more resources. While true, I would like to describe two critical obstacles that I see—one within Pennsylvania and one at the federal level.

Pennsylvania and especially Penn State are woefully behind the curve in having adequate facilities available of the biosafety level 3 type to conduct the kind of work that is and increasingly will be required for agricultural bio-security of all types. Precious few federal dollars have returned to PA to help and precious few state dollars have been identified. Our three major research universities, Penn, Pitt and Penn State, have worldwide reputations for our cutting edge research in virtually all areas yet we are woefully equipped in this area. Something statewide with federal help needs to be done to address this critical issue. Admittedly, it will be expensive; however, it must be done because the alternative risk is far, far more expensive.

At the federal level, a much more substantial structural issue is apparent. In 1994, the research and extension arm of USDA began to reorganize toward a much more flexible and efficient structure. For many reasons, the re-structuring stalled and it needs to be reenergized. This part of the agency is fraught with inefficiency, redundancy and poor coordination such that the 100 plus year federal-state land grant partnership is at risk. A system that has served worldwide food security so well throughout the 20th century is not prepared to deal with 21st century issues. We need to find ways to better coordinate an already multibillion dollar portfolio within the ARS, ERS, and CSREES as well as in other agencies. I serve on a national task force that has been attempting to re-energize this reorganization. Without question, the obstacles are great but our resolve must be even greater because without it, the outcome will be something nobody wants. This Senate Subcommittee will play a key role in helping to rewrite the authorizing language of the Farm Bill that will be necessary for us, working together for the common good, to get it done.

Time and resources needed for implementation of programs

Without question, the post World War II model leading to the development of the National

Institutes of Health has been an unqualified success story. In my view, a major reason has been the recognition from early on that large complex research and education projects need stability of funding. What emerged was a more or less 5 to 10 year pattern of funding that could be renewed for additional 5 to 10 year increments based upon past performance and proposed new work addressing priority areas. In short there were no entitlements, yet many projects enjoyed decades long support because they were high quality and of high priority. We need to move closer to this model in agricultural bio-security, not farther from it. Again, this will require re-thinking our organizational structure, particularly with respect to balancing intramural and extramural research and outreach programs. In the end, however, we must be certain that there are adequate resources to support the existing workforce and to recruit and prepare the next generation workforce for the food and fiber sector, particularly in the area of agricultural bio-security.

Identify redundancies where better coordination among parties would increase bio-security

Several federal agencies support work in bio-security ranging from very basic to applied translational work. The new Department of Homeland Security was, in part, set up to help coordinate much of this work. Clearly that has not yet happened to virtually anyone's satisfaction. As one example, the Cooperative Extension funded EDEN network described above is every bit as much of a priority for homeland security and defense as it is for agriculture programs. Wouldn't it make sense for Homeland Security and Defense funding to help underpin and broaden this already in place and time tested successful county based program network than develop yet another stand alone network?

Redundancy is a difficult issue. From a distance, what may appear as a redundancy actually is not upon closer inspection. The issue here is to always question whether what we are doing either is being done somewhere else, or perhaps more to the point, could be done better elsewhere. The key is communication and coordination and to have open assessment and accountability measures in place. I believe that we strive to do this at Penn State.

Specify which issues are within the purview of the government and which devolve to the private sector

Much of this has been addressed above but I would add there can be no question that matters relating to the protection and advancement of our food, water and fiber supply are in the public good. As we've become increasingly aware of late, these are matters in the public interest but also in the interest of our national defense. Therefore, the public through the legislative and appropriations process must be prepared to support these interests through their support of research, education and outreach programs coordinated at the federal, state and local level. Again, this is particularly important with respect to support of the current workforce but also in the identification and education of the next generation workforce. The private sector has an obligation here as well for it is in this sector where many of these individuals will come to be employed. These young people are the future creators of new knowledge and innovators and they will be crucial to the future success of the private sector.

So I conclude by coming back to the question- Are we prepared? My answer is- Not nearly well enough. Through our existing fund of knowledge we can do a better job and with ongoing

support for continuing to close our knowledge gaps in this generation and beyond, we will do a better job. If we don't, then who will?

Thank you again for the invitation to participate and provide testimony on this topic important to all Pennsylvanians and all Americans. I would be pleased to elaborate on anything I've mentioned or to provide any additional information to you, other members of your Committee, or your staff.