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House Committee on Agriculture

"American Agriculture and Our National Security"

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Good afternoon Chairman Conaway, Vice-chairman Neugebauer, Ranking-Member Peterson, and Members of the House Committee on Agriculture,

My name is Tammy Beckham and I am the Dean of the College of Veterinary Medicine at Kansas State University.

Thank you for the opportunity to speak to you today regarding the importance of American Agriculture and its relationship to U.S. National Security.

Agricultural Security and its Relationship to National Security

The Food and Agricultural System in the U.S. is one of sixteen critical infrastructures whose assets, systems, and networks are considered to be so vital to the U.S. that their incapacitation or destruction would have a debilitating effect on security, the national and global economy, public health and safety, or any combination thereof. The agricultural sector has been deemed a critical infrastructure for the U.S. in that the health of this enterprise is critical to ensuring the Nation's economic viability, the safety and security of our food systems, and ultimately, the health and safety of the public health sector.

The U.S. Agricultural sector is a diverse, complex and highly integrated enterprise whose health and productivity is vital to the national economy. Agriculture in the U.S. is a $1 trillion business and this sector alone employs approximately 9.2% of American workers. In 2013, agriculture and agricultural-related industries contributed $789B to the U.S. gross domestic product (GDP)[1] and in 2012, domestic animal agriculture (e.g., livestock and poultry production) produced approximately 1.8M jobs, $346B in total economic output, and $60B in household income[2]. Furthermore, in the U.S., consumers spend on average, approximately 6.4% of their annual

expenditures on food. This percentage is extremely low when compared to other countries whose expenditures range from 11% (Switzerland) to 47% (Pakistan)[3]. U.S. farmers and ranchers work hard to keep food prices low and are only able to accomplish this through increased efficiencies in production. Increased efficiencies have been gained through technological advancements in industrial food production. Threats that jeopardize our production and the security and affordability of the U.S. food system have the potential to disrupt our social structure and cause political instability.

The bulk of the agricultural enterprise is almost solely owned and operated by the private sector, and the U.S. is currently the world's leading exporter of food. When evaluating the impact on the economy, the food supply and the Nation's jobs, it is clearly evident why this industry is deemed a U.S. critical infrastructure. Any disruption to the daily operations and/or productivity of this enterprise would have significant impacts on Americans' livelihoods, our food supply, the economy and our public health. Simply said, U.S. agricultural security *is* national security.

In addition to understanding the importance of the agricultural industry in the U.S. and its role in supporting national security, it is also important and critical that we understand the role of global food security in securing the homeland. Currently, 870 million people around the world do not have access to safe and nutritious food in a sufficient supply[4]. By the year 2050, the global population is expected to exceed 9 billion people. Nearly all of the growth is expected to occur in developing countries. Feeding 9 billion people will demand that food production is increased by 70% and more specifically, that food production in the developing world double[5]. Meeting these growing demands will be critical if we hope to maintain political stability in increasingly volatile regions across the globe.

Food insecurity and scarcity is well known to be one of the most potent drivers of political instability and social unrest. In fact, according to the Lugar Center, "global food security has both foreign policy and national security implications for the U.S. Diplomatic efforts to maintain peace and stability are much more difficult whenever there are food shortages contributing to extremism and conflict"[6]. Perfect examples of this have been seen throughout the Middle East and North Africa, where countries import over half of their food[7]. Food insecurity in this region often leads to underlying structural pressures that can result in rioting and other public displays of dissatisfaction, or sociopolitical instability. In fact, it is well documented that although the Arab Spring was not about food insecurity, it is likely that the rapid rise in international food prices caused middle class urban populations in these regions to experience acute food insecurity, which provided the necessary motivation for the people to generate unrest[8]. Therefore, it is easy to see how U.S. investments in food security and nutrition for developing countries and areas of conflict is in the interests of the U.S., as international food security and U.S. national security are tightly intertwined[9].

Threats and Vulnerabilities of the U.S. Agricultural System

As I testify before you today, U.S. citizens reap the benefits of a robust agricultural industry that provides them with access to a safe, abundant and affordable food supply that is readily available on the shelves of grocery stores nationwide. This is indeed a privilege that as you well know, does not exist globally. However, the very elements that make the U.S. agricultural system robust and productive also make it vulnerable to a natural or intentional introduction of a biological agent. In fact, perhaps now, more than anytime in our history, the agricultural industries are at risk from a variety of threats that have the potential to severely disrupt our economy, our food supply and cause great harm to our public health sector.

Threats to our U.S. agricultural system can come in a variety of forms to include a natural introduction of a foreign (transboundary) animal, emerging, and/or zoonotic disease or an intentional introduction of a biological agent (agroterrorism) into our agricultural systems. These threats would result in significant morbidity and/or mortality, cause great economic harm, adversely impact and/or disrupt our food supply and/or contribute to an adverse public health event. Many of these agents do not require weaponization, can be easily obtained, and exist naturally in areas in which terrorist groups such as the Islamic State (ISIS), al-Qa'ida, al-Shabaab, Boko Haram, and others who intend to harm the U.S. operate. In addition, the risk from emerging infectious and/or zoonotic diseases continues to threaten our animal, plant, and public health sectors.

The U.S. agricultural and public health systems, while free from devastating diseases such as Foot and Mouth Disease (FMD, since 1929), African Swine Fever (ASFV), Rift Valley Fever (RVF), and other highly pathogenic livestock and zoonotic diseases, are becoming increasingly at risk for an introduction of these and/or other emerging and/or zoonotic diseases. Impacts resulting from an introduction of a high consequence disease, agro-terrorist and/or bioterrorist agent into U.S. agricultural systems have been studied and published in peer reviewed journals. Studies indicate that the magnitude and severity of an introduction of a high consequence disease into U.S. livestock or poultry herds/flocks would be large. For example, a study recently completed by Kansas State University researchers predicted that costs associated with an FMD outbreak in the Midwestern U.S. could result in a total of $188B in losses to the livestock and allied industries and up to $11B to the U.S. government[10].

In addition to publications highlighting the economic and social impacts of a disease incursion, we have learned first hand from recent experiences that the social, economic, and political fall out from emerging disease incursions can be devastating. In fact most recently, the U.S. has witnessed the incursion of porcine epidemic diarrhea virus (PEDV) in our swine herds (2013), highly pathogenic avian influenza (HPAI) in our poultry populations (2015) and last but certainly not least Ebola virus (EBOV) disease in our public health sector (2014). This demonstrates our vulnerability to newly emerging and re-emerging pathogens.

In the case of PEDV, the cause and route of introduction into the U.S. swine population has still not clearly been elucidated. Nevertheless, over half of the U.S. sow population was infected

with PEDV, and the industry lost 10% (7M) of the piglets born to these sows during this outbreak[11]. More recently, the introduction of HPAI virus into the U.S. poultry population resulted in approximately 7.5M (7.5%) of the U.S. turkey population and 41.1M (10%) of the commercial chicken population being depopulated. The total indemnity costs for this outbreak was approximately $191M[12]. The PEDV and HPAI outbreaks have reminded us that although we have made significant progress as a Nation and as a sector preparing for both natural and intentional introductions of transboundary, emerging and zoonotic diseases, they remain continual threats to the U.S. agricultural system and we still have a tremendous amount of work to accomplish.

It was during the 2014 Ebola virus outbreak in the U.S. where the meaning of the term "One Health" took on a new significance and some of the greatest lessons were learned and largest gaps in biodefense highlighted. Gaps that were highlighted include but are not limited to: 1) a lack of available, licensed medical countermeasures (MCMs), 2) a lack of available scientific evidence to support informed decision making on the risk of EBOV infections in companion animals and livestock to our public health sector, 3) a lack of available training for veterinarians, state and local animal health workers, first responders, and our medical counterparts that would properly prepare them for handling a high consequence zoonotic event, 5) a lack of policies and procedures that define appropriate handling of contaminated medical waste, and 6) a lack available scientific evidence to support informed development of policies and procedures for appropriate handling/care of potentially exposed companion animal and livestock. As such, it was during this outbreak that the term "One Health" came to the forefront for the majority of the veterinary and medical community.

This increased risk of the above mentioned threats to the U.S. agricultural and public health systems can be attributed to several social, environmental, and economic factors. First, there is increased movement of people, animals, plants, and products globally. Global commerce and air traffic moves at speeds that defy the ability to detect and prevent movement of diseases from their source in the early stages before detection. Indeed, animals and people can move and travel prior to clinical signs of a disease, thus arriving in another country already infected and able to spread the disease to people or animals they come in contact with. Second, trends in livestock production in the U.S. have resulted in more specialized, intensive, and concentrated farming practices where large numbers of animals are produced on a much smaller number of premises. These vertically integrated systems manage movements of animals and animal products to ensure a "just-in-time" delivery to the next location (e.g., feedlot, finisher, packer, and retailer) in the food production system. Our livestock production systems execute a large number of animal movements daily. As an example, it is estimated that approximately 1M swine and 400K cattle are in transit to the next location in the production system at any one time during the day. An introduction of an agent either naturally or intentionally into these intensive farming systems could lead to wide-spread distribution through these movements within hours of its introduction into the system. Furthermore, in the event of a disease outbreak in which a "standstill" or quarantine of animal premises is the primary control strategy implemented in the U.S., maintaining business continuity through the controlled movements of animals is critical for food security and animal health and welfare.

Next, obtaining agents that can be utilized to promulgate an agro-terrorist event and/or a bioterrorist event against our agriculture and public health sectors does not require advanced capabilities. Many of the agents on the list of those most likely to be utilized to execute an agro-terrorist and/or bioterrorist event (such as FMDV, ASFV, and Ebola) are readily available in countries throughout the world and do not need advanced capabilities or weaponization. As mentioned previously, these agents are readily available in countries in which terrorist groups such as the Islamic State (ISIS), al-Qa'ida, al-Shabaab, Boko Haram, and others who intend to harm the U.S. operate. Lastly but certainly not least, we must not overlook the natural occurrence and emergence of diseases whether agricultural or zoonotic. Factors that lead to the emergence of disease include changes in socio-economic, environmental and/or ecological circumstances[13]. It has been estimated that over 75% of all emerging pathogens are zoonotic and that zoonotic pathogens are twice as likely to be associated with an emerging disease than non-zoonotic pathogens[14]. In addition, there are approximately 320,000 unknown viruses that infect mammals and that have not yet been identified and/or characterized[15].

Although the social, environmental and economic drivers of risks are critical to understanding the threats to the sector, there are additional factors that contribute to the vulnerability of the U.S. agriculture and public health sectors. For many of the diseases that threaten our industries, we lack the necessary MCMs for early detection, identification, response, and recovery. Although we have made significant advances with the U.S. licensure of the first FMD vaccine that could be manufactured in the U.S. and the validation and deployment of molecular assays capable of supporting early detection and response to the National Animal Health Laboratory Network (NAHLN), in order for us to effectively detect, identify, characterize, respond to, control, and recover from an outbreak of a known or emerging pathogen, we still have much to accomplish.

Critical Needs Remain for Protecting U.S. Agricultural and National Security

In order to mitigate these threats and vulnerabilities and protect U.S. agricultural and national security, we must act immediately to the critical needs remaining to be addressed. There is a critical need for development and licensure of additional vaccines for the remaining serotypes of FMDV and other high consequence animal and zoonotic disease agents (Classical Swine Fever (CSF), ASFV, Hendra virus, RVFV, Ebola, etc.). Along with the vaccines, we must develop and validate new diagnostic technologies to help us detect and identify both known and emerging pathogens. We must develop, in collaboration with the industries and stakeholders, policies and procedures to allow for an appropriate response to emerging disease affecting our industries. In addition, we must work closely with our end-users, stakeholders, and first-responders to develop a robust, integrated biosurveillance system capable of capturing and analyzing data on animal, human and wildlife health. This same biosurveillance system must simultaneously provide useful information and incentives to encourage data owner participation. We must work to develop data elements and standards that can be utilized across the agriculture and public health sectors and simultaneously work to develop policies that will allow for efficient sharing of data while working to protect the confidentiality of the data owners. We must work to identify incentives and provide rewards for participation in

early disease reporting among our agricultural and public health sectors. We must work to prepare our first responders, veterinary workforce and our medical counterparts through robust training programs in early recognition, disease response, personal protection, and biosafety. And finally, we must work to support our state, local, and tribal governments in the development and exercising of response plans. In order to accomplish these lofty goals, we must work in multi-disciplinary teams to leverage knowledge and resources. We cannot simply discuss the "One Health" concept, but we must embrace it fully and ensure it *is* institutionalized across disciplines and recognize the value of working together to protect the U.S. agriculture and public health sectors, for indeed a healthy agricultural system equates to a safe and secure food supply and a healthy public health sector.

The ability to protect our agricultural industries, food supply, and public health sectors from natural introductions of biological agents, agro-terror threats, and emerging and re-emerging diseases is heavily dependent on an organized, strategic, and well funded approach. This approach should institutionalize the "One Health" concept, be highly collaborative in nature, leverage all available resources and encompass an international, global health component.

Since the formation of the U.S. Department of Homeland Security (DHS) in 2002 and with the release of Homeland Security Presidential Directive 9: Defense of United States Agriculture and Food (HSPD-9), DHS has assumed the responsibility to coordinate the overall national effort to protect the critical infrastructure and key resources of the U.S., which includes agriculture. However, the U.S. Department of Agriculture (USDA) still has the primary responsibility for protecting the agricultural sector[16] and does so with support from additional agencies to include the Department of Health and Human Services (DHHS), the Department of Interior (DOI), the Environmental Protection Agency (EPA), the Federal Bureau of Investigation (FBI), the Central Intelligence Agency (CIA), the Department of Defense (DOD), and the Attorney General (AG). Despite interagency agreements that exist, the coordination of a comprehensive biodefense program against agricultural and human health threats is lacking. To date, an organized, multi-year, well-funded strategy and commitment has not materialized.

For example, recent statistics indicate that during the FY2014, 61% of federal funding for biodefense was allocated to the Department of Health and Human Services (DHHS). By comparison, 1% of federal government funding for biodefense was allocated to the USDA for agricultural biodefense. Perhaps just as significant is the discrepancy between funding for the Strategic National Stockpile (SNS, the U.S. national repository of antibiotics, vaccines, chemical antidotes, antitoxins, and other critical medical equipment and supplies), ~ $510M)[17] when compared to its sister entity, the National Veterinary Stockpile (NVS, < $4M). Likewise, in 2007, the Laboratory Response Network had an annual budget of approximately $50M[18] while the animal health laboratory equivalent (the National Animal Health Laboratory Network (NAHLN) receives only $6M dollars annually to support its operations. If the Nation is to establish a robust biodefense strategy that includes a commitment to institutionalize the "One Health" concept, funding levels must be increased to the agricultural sector and strategically utilized. Only then will robust interdisciplinary research programs and MCM development that include U.S. agriculture begin to keep pace with and complement ongoing activities within the human

health and public health biodefense program. Of course, appropriate metrics and accountability of the dollars must accompany any increase in funding and this could be accomplished by an interagency/industry panel such as the recently suggested White House Biodefense Coordination Council[19].

Conclusions

The U.S. agricultural sector is critically important and intimately linked to the national security of the United States. The agricultural and allied industries are leaders in world food production and provide the citizens of the U.S. the safest, most affordable food supply on the globe. At the same time, these industries are under tremendous pressures from external forces and as such, they are also extremely vulnerable to a wide-range of biological threats. Obviously, protection of this critical infrastructure is vital to maintaining a safe, affordable, and secure food supply, protecting public health from emerging and zoonotic diseases, and maintaining social and political stability at home.

Since the events of 2001 and the implementation of several key homeland security presidential directives, we have made significant advances in preparing our agricultural sector to face the challenges posed by a natural or intentional (agroterrorism) introduction of a biological agent. However, as demonstrated recently during the PEDV, HPAI and EBOV outbreaks, we are often reactive in nature and less proactive when it comes to preparing for the next emerging biological threat. As such, it is critically important that the U.S. government and its private partners come together and work to add both a sense of urgency and direction to the Nation's biodefense preparedness efforts. The recent report from the Blue Ribbon Study Panel on Biodefense (A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts[21]) provided strong recommendations for building a blueprint to address our Nation's gaps. The report's authors called for appointing a central leader with the authority to institutionalize biodefense and the "One Health" initiative. In addition, the authors recommended the formation of a White House biodefense coordination council composed of representatives from federal agencies, stakeholders and private industry. The formation of a biodefense panel would allow for greater coordination and provide a platform for the development of a more cohesive and collaborative national biodefense strategy. Furthermore, a leader and/or council that could assemble a robust team of federal and industry partners could help lower barriers that prevent our ability to truly implement the "One Health" initiative. Barriers to this could be overcome with time, collaboration, interdisciplinary programs and budgets to support and incentivize working together to prepare our Nation for the next emerging disease event. Indeed, the One Health concept must be understood, adopted and become part of the fabric of the way in which we approach biodefense.

Finally, Chairman Conaway, Vice-chairman Neugebauer, Ranking-Member Peterson, and Members of the House Committee on Agriculture, I want to thank you for this opportunity to speak to you regarding the importance of agriculture to national security. I look forward to your questions.

[1] USDA Economic Research Service. http://ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy.aspx

[2] Economic benefits of the Livestock Industry. iGrow, South Dakota State University Extenstion. July 2014.

[3] USDA Economic Research Service. http://www.ers.usda.gov/data-products/food-expenditures.aspx#.UuE9EHn0Ay5

[4] USDA. Food Security. http://www.usda.gov/wps/portal/usda/usdahome?navid=food-security.

[5] How to Feed the World 2050: Global agriculture towards 2050. High-Level Expert Forum. Food and Agriculture Organization (FAO). Rome October 12-13, 2009.

[6] Global Food Security. The 2050 Challenge. The Lugar Center. http://www.thelugarcenter.org/ourwork-Global-Food-Security.html

[7] Barrett, Christopher B., ed. Food Security and Sociopolitical Stability. Oxford University Press, 2013.

[8] Food Insecurity and Unrest in the Arab Spring. Thomas Tree, Sept 7, 2014. http://www.e-ir.info/2014/09/07/food-insecurity-and-unrest-in-the-arab-spring/

[9] Food, national security intertwined, experts say. Eric Mortenson. Capital Press, June 18, 2015.

[10] Economic impact of alternative FMD emergency vaccination strategies in the Midwestern united states. Ted C. Schroeder, Dustin L. Pendell, Michael W. Sanderson, and Sara Mcreynolds. Journal of Agricultural and Applied Economics. Volume 47, Issue 01, Feb. 2015. Pp 47-78.

[11] PEDv Dominates the Pig World. Gene Johnston. September 11th, 2014. http://www.agriculture.com/livestock/hogs/health/pedv-dominates-pig-wld_284-ar45068

[12] Update on H5Nx, Mia Torchetti, U.S. Department of Agriculture Animal and Plant Health Inspection Service, National Veterinary Services Laobratories, August 18th, 2015.

[13] Global trends in emerging infectious diseases. Nature. Kate E. Jones, Nikkita G Patel, Marc A Levy, Adam Storeygard, Deborah Balk, John L Gittleman, Peter Daszak. Volume 451; 21FEB2008

[14] Taylor, L.H., Latham, S.M., Woolhouse, M.E. 2001. Risk factors for human disease emergence. *Phil Trans R Soc Lond* 356:983-989.

[15] Anthony, S.J., *et. al.* 2013. A strategy to estimate unknown viral diversity in mammals. *MBio* 4:e00598-13; doi: 10.1128/mBio.00598-13.

[16] Public Health Security and Bioterrorism Preparedness Response Act, 2002. http://www.gpo.gov/fdsys/pkg/PLAW-107publ188/pdf/PLAW-107publ188.pdf

[17] Federal Agency Biodefense Funding, FY2013-FY2014. Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science. Volume 11, Number 2, 2013. Pp 196-216.

[18] State Public Health Laboratories: Sustaining Preparedness in an Unstable Environment. March 2009, Association of Public Health Laboratories.

[19] A National Blueprint for Biodefense. A Bipartisan Report of the Blue Ribbon Study Panel on Biodefense. October 2015.