Testimony: Need for NBAF Capabilities in the United States
Summary of the report titled *Qualitative Risk Assessment for the National Bio and Agro-Defense Facility*, Presented on January 24, 2012

Hello, my name is Eric Hess. I am a vice president of SES, Incorporated, a natural resources, environmental and agri-security consulting firm located in Merriam, Kansas. SES has been providing agri-security support to private industry, local jurisdictions and states since 2004. Our agri-security expertise spans preparedness, mitigation, response and recovery. Since 2004 we have provided this support to almost 350 counties, 20 states and several agriculture trade associations. I appreciate this opportunity to address the committee on the need for a continued large animal research and diagnostic capability in the United States.

This testimony will address the need for a state-of-the-art, large animal, contagious disease research facility such as the National Bio and Agro-Defense Facility (NBAF) and will examine the risk to the livestock industry if the U.S. loses this capacity. Currently this disease research is being conducted at the Plum Island Animal Disease Center (Plum Island), off the coast of New York. The Plum Island facility is scheduled to be closed in the near future and the Department of Homeland Security is planning to build a replacement facility, NBAF, in Manhattan, Kansas.

This presentation will begin with a consideration of recent case studies of contagious animal diseases and the impact that these disease emergencies had on their respective countries. The presentation will then address a brief review of recent zoonotic disease outbreaks. The third part of the presentation considers the risk of a highly contagious and economically devastating disease being introduced

into the U.S. The last section explores the ability of existing U.S and international laboratories to perform the research and diagnostic missions of NBAF.

Agriculture is the largest industry and employer in the United States, generating more than $1 trillion in economic activity annually. A key component of this economy is the livestock industry, which contributes over $100 billion annually to the gross domestic product. U.S. agriculture is threatened by the entry of foreign pests and pathogens that could harm the economy, the environment, plant and animal health, and public health. Diseases affecting livestock could have significant impacts on the U.S. economy and consumer confidence in the food supply. The introduction of animal diseases at the farm level would cause severe economic disruption given that agriculture accounts for 13 percent of the U.S. gross domestic product and 18 percent of domestic employment. The economic disruption would be magnified by trade embargoes imposed on U.S. livestock and poultry products.

RECENT LIVESTOCK DISEASE OUTBREAKS AND THEIR IMPACT

Foot and Mouth Disease (FMD) is one of the most contagious animal diseases known. History has shown that it is also among the most economically devastating. For this reason, I will review several of the most recent FMD outbreaks to illustrate the potential threat faced by the U.S. livestock industry.

FMD is an economically devastating livestock disease that affects cloven hoofed animals. FMD is not fatal to livestock but greatly reduces productivity. Maintaining an "FMD Free" status from the International Organization for

Epizootics (OIE) means there are no FMD related trade embargos. A country recognized as having a current outbreak of FMD or having endemic status may be prohibited from exporting livestock products.

In 2001, an FMD outbreak presented the United Kingdom (UK) with an economic disaster only rivaled by World War II for its impact on the country. The outbreak lasted approximately one year, resulted in approximately 10 million animals being euthanized, and cost the U.K. over $15 billion.

The most recent FMD outbreak in South Korea lasted from late 2010 to the summer of 2011. During South Korea's response almost 3.5 million cows, pigs and other animals were euthanized. This has been the most severe FMD outbreak in South Korea's history, resulting in losses of more than $2.8 billion.

On April 20, 2010, Japan reported an outbreak of FMD in the Miyazaki Prefecture. Over the course of the 11 week outbreak, Japan euthanized and buried over 200,000 infected and susceptible animals. The Miyazaki Prefecture estimates that recovery from the 2010 FMD outbreak will take five years and have an economic impact of around $3.6 billion. This prefecture is 34 times smaller than Kansas.

RECENT ZOONOTIC DISEASE OUTBREAKS

Zoonotic diseases can be transferred from animals to humans and vice versa. Many serious human diseases begin in animals and then through genetic drift or recombination become capable of infecting humans. It is important to study and understand zoonotic disease development and transmission in livestock in order to

prevent future outbreaks and threats to human health. Changes in human behavior, and the fact that the human population continues to expand and encroach on the territory of wild animals and livestock production, creates conditions favorable for the creation of new and emerging zoonotic diseases.

West Nile Virus came to the U.S. in June 1999 and began with significant bird die-offs. In August of that year, the first human cases of West Nile Virus infection were identified. It was not until late September that the link between the bird die-offs and the human health cases were made. West Nile Virus is now endemic to the U.S. with approximately three million infections confirmed in humans from 1999 to 2008.

In March 2003, the World Health Organization (WHO) identified Severe Acute Respiratory Syndrome (SARS) as a new disease and a worldwide threat. In late July 2003, the last cases were reported. More than 8,000 people became sick with SARS and 774 died. It took three years of research to identify the source of this outbreak. It is believed that this outbreak started in China when the virus spread from bats, through intermediate host, to humans. Bats are a natural reservoir for many viruses, including Ebola, Hendra and Nipah.

The Novel H1N1virus outbreak was first detected in the United States in March 2009. This virus was identified as a unique combination of influenza virus genes. Early reports referred to the virus as a swine-origin influenza virus (swine flu). The early reports identifying a virus as swine flu made consumers leery of buying pork products. Many consumers believed eating pork could give them influenza. Tyson Foods, Inc. reported a drop in domestic pork sales. As pork sales fell, retail

and wholesale hog prices fell sharply. Later research revealed that this virus did not originate from swine.

THE RISK OF A FOREIGN ANIMAL DISEASE ENTERING THE U.S.

In order for livestock in the U.S. to become infected with a foreign or emerging animal disease there must be a disease source, a pathway of exposure and susceptible animals to become infected. These three factors combine to create a cycle of infection.

Many foreign animal diseases pose significant threats to livestock and poultry production in the U.S. This is due to the fact that animals in the U.S. have never been exposed to these diseases and thus they have no inherent immunities. In addition, veterinary medicine in the U.S. is not geared to identify and treat these diseases efficiently. There are more than 40 contagious foreign animal diseases that are recognized as high consequence threats to the U.S. agricultural industry.

Sources of Disease

Generally, the source of foreign animal disease is in infected animals. These animals may exhibit clinical signs of a disease or they may simply be carriers, not significantly impacted by the infection. Countries with a foreign animal disease are either classified as actively fighting the disease or they have decided to live with the disease, making it an endemic disease.

OIE tracks the occurrence of foreign animal diseases throughout the world. FMD is an example of one of the 40 high consequence foreign animal diseases threatening U.S. agriculture. OIE currently reports 82 countries with FMD. These countries are mainly in Africa, Asia, Eastern Europe and Russia. Some of these countries are actively fighting the disease and others have it as an endemic disease. Many of the 40 high consequence animal diseases are endemic in multiple countries, supplying a constant source for these diseases.

Disease Pathway

The disease pathway is the mechanism by which a disease can move from its source to a susceptible animal. Foreign animal diseases can be transmitted directly between animals and indirectly through the movement of contaminated materials or in the air.

For example, FMD is transmitted by both direct contact between animals and indirect contact through contaminated items such as vehicles, clothing, etc. FMD can also be transmitted as an aerosol. Once infected, FMD virus is present throughout an animal's muscle tissue, its excretions and it is breathed out through the lungs. The virus can survive in meat up to a year when frozen; in feces for 2 weeks to a year depending on weather conditions; and up to 200 days in soil.

Researchers have attributed the cause of the 1997 FMD Taiwan outbreak to smuggling meat and live animals from China. This event decimated the Taiwanese pork industry and to date it has not recovered.

The 1967-1968 FMD outbreaks in the U.K. were most likely caused by meat imported from South America.

The 2001 FMD outbreak in the U.K was caused by a hog producer feeding his hogs infected food-waste obtained from a Chinese freighter.

FMD outbreaks in Siberia, Mongolia and South Africa in 2000 have been attributed to feeding pigs food-waste and illegal movements of infected livestock. The 2000 outbreak in Japan was attributed to possible FMD contamination of straw imported from China.

The 2010 FMD outbreak in South Korea was caused by an immigrant farm worker who received a package of clothing and shoes infected with the FMD virus. In March 2011, an additional outbreak occurred in South Korea, caused by a farmer returning from a trip to China.

Foreign animal disease can be introduced into a country intentionally or unintentionally by human action or by natural causes.

Precedent exists for an intentional introduction of a foreign animal disease. In World War I German agents introduced Glanders into the eastern front to infect Russian horses. The Soviet Union may also have introduced Glanders into Afghanistan in the 1980s.

Foreign animal diseases can also be used as weapons by terrorists. Although there are no known incidents of terrorists using a foreign animal disease as a weapon, there is evidence that terrorists have considered using a foreign animal disease for

this purpose. Documents obtained in 2002 from a cave in Afghanistan detail methods for culturing biological weapons targeting people, crops, and animals.

Intentional introduction of a disease such as FMD does not currently fit the modus operandi (MO) of terrorist organizations. These groups want to strike symbolic targets, kill many Americans and claim responsibility soon after the event. Agro-terror does not fit this structure; however, if the MO of the terrorists groups shifts to maximizing economic damage, an attack on agriculture and food production in the U.S. would become more likely.

Unintentional introduction of a foreign animal disease could come from the importation of infected animals. United States Department of Agriculture (USDA) data show that almost 2.3 million cattle were imported in 2010. About half the cattle originated in Canada and half originated in Mexico. In 2001 the U.S. imported 5.7 million hogs, mainly from Canada. The U.S. imported about 1,500 sheep and goats in 2010. The sheep and goats originated from Canada, New Zealand and Australia. All of these countries are currently FMD free. The risk of animals entering the U.S. from FMD free countries and infecting domestic livestock is minimal. However, the possibility of trans-shipments of animals, with the FMD free country acting as an intermediate, must be considered. There is precedence for undocumented, economically motivated, trans-shipments of agricultural products into the U.S. to avoid food safety restrictions. For example China has been caught transporting honey to the U.S. through undocumented intermediate locations.

The risk of introduction of FMD through unintentional acts generally involves indirect exposure of a susceptible animal with contaminated materials. This type

of unintentional introduction could occur by a number of mechanisms including: immigration, international travel, international trade and mail.

In 2010, over 1 million people established permanent legal status in the U.S. Of these more than 500,000 were from Africa and Asia.

The U.S. Department of Transportation reports that there were more than 160 million US-international passengers in 2010.

In 2009 the U.S. Census Bureau reported that there were 38.5 million foreign born residents of the United States. Of these residents 27.7 percent were from Asia, and 3.9 percent were from Africa. FMD is endemic in parts of both these continents. It is possible that some portion of these 38.5 million foreign-born residents receive mail and packages from their family and friends remaining in their countries of birth. If items mailed into the U.S. are contaminated with the FMD virus or some other foreign or emerging animal disease, then an outbreak could occur assuming the item came into contact with a susceptible species.

A natural outbreak of a foreign animal disease such as FMD, in the United States, is possible if either Mexico or Canada had an outbreak. Wildlife or short range aerial dispersion could transmit the disease into the United States.

Susceptible Animals

In order for an outbreak of a foreign animal disease to occur the disease must infect a susceptible animal. Susceptible animals can include wildlife. Susceptibility or ease of infection varies by species and disease. FMD is considered to be the most

infectious disease known, allowing it to most easily make the jump from transport to infection.

The risk of an FMD outbreak in the U.S. is mostly a function of completing the cycle of infection, linking up with susceptible animals. The U.S. actively works to block the exposure of susceptible animals. At the production level, growers institute biosecurity to isolate their animals from disease. Customs officials monitor all international arrivals of air passengers and monitor imports. Customs officials seize an average of over 4,000 illegal animal products, meat or plant items every day.

LARGE ANIMAL DISEASE LABORATORY CAPABILITIES

The Department of Homeland Security intends the NBAF to be much more than just a replacement facility for Plum Island. The highest level of biocontainment available at Plum Island is Biosafety Level 3 Agricultural (BSL-3Ag). NBAF will perform experiments with some pathogens that require a higher level of biocontainment, a portion of the facility will include BSL-4 laboratories.

Research at NBAF will focus on FMD, Classical Swine Fever, African Swine Fever, Rift Valley Fever, Nipah Virus, Hendra Virus, Contagious Bovine Pleuropneumonia, Japanese Encephalitis, and other emerging diseases as necessary. The research will study how these pathogens infect animals; what types of cells the disease affects; what effects the disease has on cells and animals; and how newly developed countermeasures, such as vaccines and anti-viral therapies, help animals develop protection against disease. In addition, NBAF will be used to

continue the foreign animal disease diagnostician training that is currently done at Plum Island.

OTHER DOMESTIC LABORATORY CAPABILITIES

There are several other existing or planned BSL-3Ag facilities in the U.S. including:

- The Biosecurity Research Institute in Manhattan, Kansas
- University of Georgia-Animal Health Research Facility in Athens, Georgia
- University of Wisconsin Influenza Research Institute in Madison, Wisconsin
- Plant and Animal Agrosecurity Research facility in Wooster, Ohio (planned construction)

These laboratories are considerably smaller than NBAF and they do not include BSL-4 containment facilities.

There are two federal BSL-3Ag facilities within USDA; the facility in Ames, Iowa and the National Wildlife Research Center (NWRC) in Fort Collins, Colorado. The Ames facility is studying different species and diseases and is already operating at capacity. The Fort Collins facility has a mission that does not encompass the same research needs as NBAF. In addition, neither laboratory has BSL-4 capabilities.

There a number of a number of BSL-4 facilities in the U.S. that study known and emerging infectious zoonotic diseases, such as:

- The National Center for Zoonotic, Vector-Borne, and Enteric Diseases at the CDC in Atlanta, Georgia
- The U.S. Army Medical Research Institute of Infectious Diseases in Fort Detrick, Maryland
- The National Biodefense Analysis and Countermeasures Center in Fort Detrick, Maryland
- National Institute of Allergy and Infectious Diseases/National Institutes of Health Laboratories in Galveston, Texas and in Hamilton, Montana
- Boston University National Emerging Infectious Diseases Laboratories in Boston, Massachusetts (under construction)

Only the Galveston laboratory has BSL-3Ag capabilities. The Galveston laboratory space is small and it is not being used for large animals. All of these facilities rely on research on small primates and small mammals such as mice, rats, and guinea pigs. None of these laboratories have BSL-4 containment for large animals.

No existing U.S. facility could meet the missions set for NBAF.

There are international laboratories that study foreign and emerging animal diseases; such as the National Center for Foreign Animal Disease in Manitoba, Canada; the Institute for Animal Health in Surrey, England; the Australian Animal Health Laboratory in Victoria, Australia; and the Federal Research Center for Virus Diseases in Animals in Riems, Germany. These international facilities do not have the capacity to address outbreak scenarios in the United States in a timely manner and cannot guarantee their availability to meet U.S. research, diagnostic, and training requirements. There is no guarantee that the research and diagnostic

priorities of a laboratory in a foreign county will mesh with those of the U.S., nor is there a guarantee that the international laboratories will have the space and capabilities to carry out U.S. research in a timely fashion.

In conclusion, the introduction of a high consequence foreign animal disease into the U.S. livestock or poultry industries is possible. Based on recent foreign animal disease outbreaks in other countries, an outbreak in the U.S. has the potential to have significant economic consequences. The capacity to conduct research on these diseases, develop countermeasures and detect outbreaks is essential in allowing the most timely and effective response to a foreign disease outbreak. Without building a replacement for Plum Island, the U.S. will lose this capacity, resulting in slower disease detection, containment and less effective response, significantly increasing the economic costs of an outbreak.