

**Written Testimony before the House Subcommittee for Emergency Preparedness,
Response, and Communications**

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Chairman Donovan and members of the Emergency Preparedness, Response, and Communications Subcommittee, thank you for the opportunity to appear today to talk about the risk that our nation faces from individuals or organizations who wish to disrupt our agricultural and food system. I am an Agricultural Economist from Mississippi State University and spend a large portion of my time researching agricultural markets and the impacts of various shocks to the markets. Our country's agricultural and food production system faces many challenges today, one of which is the risk of a major disruption to the system; whether it be in the form of a terrorist attack or from a natural disruption. It is essential that we be prepared to face these threats to prevent and/or minimize the impacts they may have on our food system.

Learning from Recent Events

In August of 2015, an outbreak of Highly Pathogenic Avian Influenza (HPAI) hit several states in the Midwest and Pacific Northwest, inflicting a significant amount of damage in its path. Iowa alone lost thirty million layers and pullets as well as 1.5 million turkeys with direct impact of just over \$658 million (Iowa Farm Bureau, 2015). In addition to the direct impact of lost production, there are also indirect impacts that need to be considered. For example, suppliers and vendors that normally market goods and services to the poultry operations will see reduced income. As a result, they will make fewer household purchases, hurting the sales of additional businesses; creating a multiplier effect. According to a study commissioned by Iowa Farm Bureau, this multiplier effect resulted in a total economic impact of \$1.2 billion to the state of Iowa's economy, including 8,444 lost jobs.

Agricultural production in the U.S. is dispersed across a large area, which helps to mitigate impacts on a national level. In the case of egg production, while Iowa saw significantly reduced production, other states saw increases in their sales. I have estimated that the state of Mississippi alone, egg producers benefited from an increase of \$93.6 million in production, a 40 percent year-over-year increase, as a result of increased egg prices. It is highly likely that several other states experienced similar increases in egg sales. Of course, the increased egg prices are ultimately passed on to consumers, increasing the average American's grocery bill. This phenomenon is also pointed out by Pendell et al. in their study of the potential release of foot and mouth disease from the future National Bio and Agro Defense Facility in Manhattan, Kansas.

Much can be learned from the HPAI outbreak in the spring of 2015. Prior to the outbreak, the poultry industry already had several bio-security measures in place. Many of those measures had been put into place by companies such as Sanderson Farms and Tyson, who own the birds but are contracting producers to grow and raise them, as a protection for their investment. Many of the protocols already in place by the bird owners were developed with the assistance of state agencies. The USDA and APHIS also had several simple, common sense guidelines in place. Despite all of these measures that were already in place, the industry was ill-prepared for actually dealing with a disastrous event such as HPAI. In the time since the outbreak in 2015, industry leaders, state agencies, and federal agencies have all come together to develop an elaborate plan to quickly and efficiently address future outbreaks. The plan includes a quarantine of the infected area, testing of all birds within a 3 mile radius, and requiring a written permit for anyone entering and/or exiting the area. The model that the poultry industry has put into place can easily be applied even in the case of agro-terrorism and provides an excellent framework for other industries as well.

Economic Impacts in Animal Agriculture

There are several things to consider when trying to estimate the economic impact of a terrorist attack on animal agriculture. First, how widespread is the damage? If the damage is localized to a single county or even multi-county area, the impact will likely be minimal. In some cases, insurance will pay indemnities to producers for the value of the animals that are lost. Indemnities may also be paid by the USDA. If facilities must be quarantined or sterilized before introducing new animals, insurance will not reimburse producers for lost future production. That could compound the economic impact of a disease outbreak, whether natural or introduced by terrorists. As mentioned above, there are also multiplier effects that must be factored in. For example, in the state of Mississippi the multiplier effect for jobs is 2.32 (Henderson et al. 2015). In other words, for every job lost in the agricultural sector there are 1.32 additional jobs lost in the rest of the economy.

One benefit of agriculture is that production is spread over a wide area. As a result, natural disasters and other disruptions to production are quite common but typically have minimal impacts on the economy and markets. For example, the February 2, 2016 snowstorm that hit much of Nebraska and Iowa prevented many cattle from being transported from feedlots to packers and all but shut down the meat packing industry for two days, but the Fed Cattle markets did not deviate from their normal patterns. A similar early January snowstorm in Texas and New Mexico killed more than 30,000 dairy cows, and caused significant local damage. Market fundamentals tell us that when supply is decreased, prices should shift higher, yet milk futures only increased slightly and the higher prices lasted less than a week before declining again. The impact of the Texas snowstorm was only temporary because although the storm brought significant local damage, 30,000 head of dairy cattle is relatively small when compared to the more than 9.3 million head of dairy cattle in the entire U.S.

One of the greatest threats from agro-terrorism that we face is the introduction of a disease or pathogen that causes our export markets to be shut down. We saw one such incident in 2003 when a cow from Washington State was found to be infected with BSE, shutting down the

majority of our beef exports (See figures 1 and 2 below). It took over seven years for U.S. beef exports to return to levels seen before the first BSE case was discovered. Despite a complete shutdown in U.S. beef exports that took several years to recover, cattle prices showed little-to-no impact as shown in figure 3 below.

Impacts in Plant-Based Agriculture

Plant-based agriculture can be broken down into two general groups: fruits and vegetables that are grown for direct human consumption and row crops that are typically grown for animal consumption or for additional processing that ultimately leads to human consumption. In the fruit and vegetable category, the biggest threat we face is the introduction of food-borne illnesses such as e-coli or salmonella. Leafy greens are of particular vulnerability due to their fragile nature that makes them difficult to clean as well as a consumer's tendency to eat them uncooked. Many fruits and vegetables are grown outdoors in the ground, where they are susceptible to contamination from natural sources such as birds, but are also easy to access by terrorists interested in introducing food-borne illnesses into the food system. While there is a system in place to detect, track, and recall contaminated foods, there is still room for improvement (Coates and Trounce, 2011).

Row crop agriculture may also be susceptible to agro-terrorism and natural disasters, however the damage must be on a wide scale to have a significant impact on the economy. The biggest threat to our row crops is a widespread drought such as the one experienced in 2012. As shown in figure 4, the 2011 drought that hit the Southern Plains and then the 2012 drought that swept through much of the Corn Belt and Southern Plains caused a substantial drop in corn production as well as a spike in corn prices. It took U.S. corn producers nearly 3 years to rebuild corn stocks to the point where markets have returned to a new equilibrium. The high grain prices caused by the 2011-2012 droughts were also responsible for the agricultural boom that the U.S. experienced in 2013 and into 2014. Farm incomes hit a record high in 2013, which provided a boost to other agricultural businesses, caused farmland values to rise, and boosted the economies in several rural states. While the impact of the 2012 drought help some in the agricultural industry, others were harmed. Higher corn prices drove up costs for livestock producers, the ethanol industry, and ultimately it drove up food prices for consumers. While unlikely, a terrorist attack that can reduce production any individual row crop could cause similar impacts as the 2012 drought. However, if harm is inflicted on only one crop I would expect markets to return to normal much more quickly than they did following a drought that impacts the production of not just one crop, but several.

In conclusion, upon examining past incidences of disruptions in production and trade across a variety of commodities, the U.S. agricultural sector has demonstrated a remarkable resilience. In most cases, it would be difficult for a terrorist to inflict damage on a large enough scale to have a lasting detrimental impact on the U.S. economy. If a terrorist were to succeed in inflicting damage on a large scale, the agricultural industry has proven that it can recover quickly from most threats. With the cooperation of individual industry groups, state governments, and the federal government in devising plans to respond to potential terror attacks or natural disasters, evidence suggests that damage from such disasters can be mitigated.

References

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Figure 1. US BEEF AND VEAL EXPORTS
Animal Equivalents, Annual

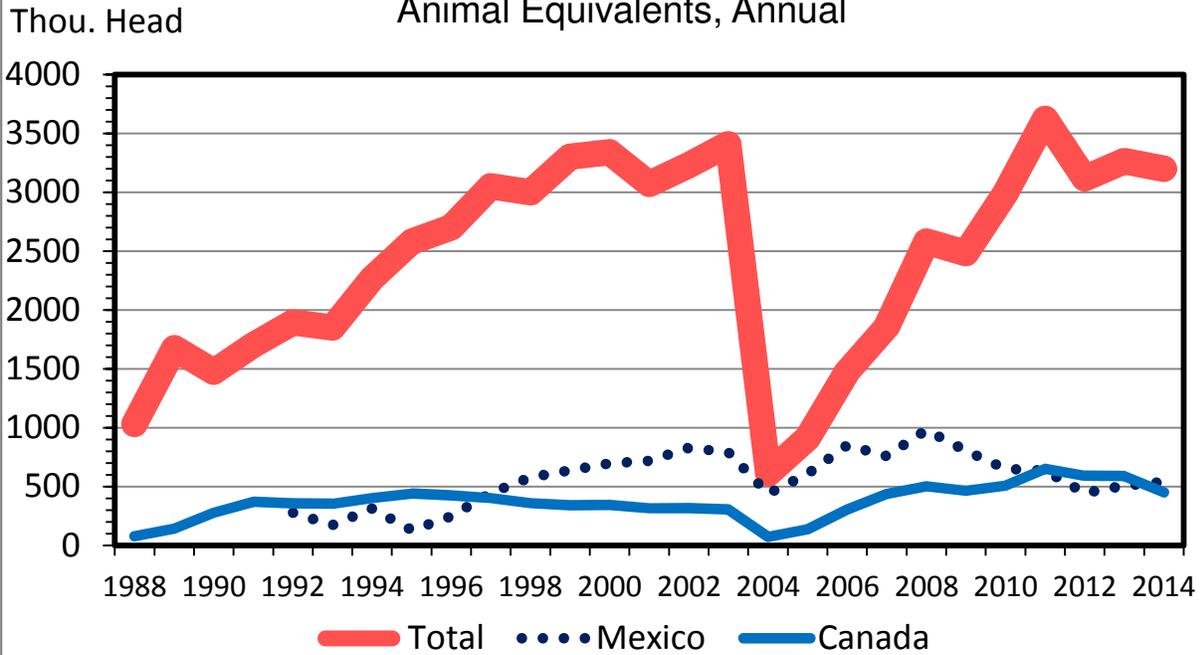


Figure 2. US BEEF INDUSTRY NET EXPORT VALUES
Annual

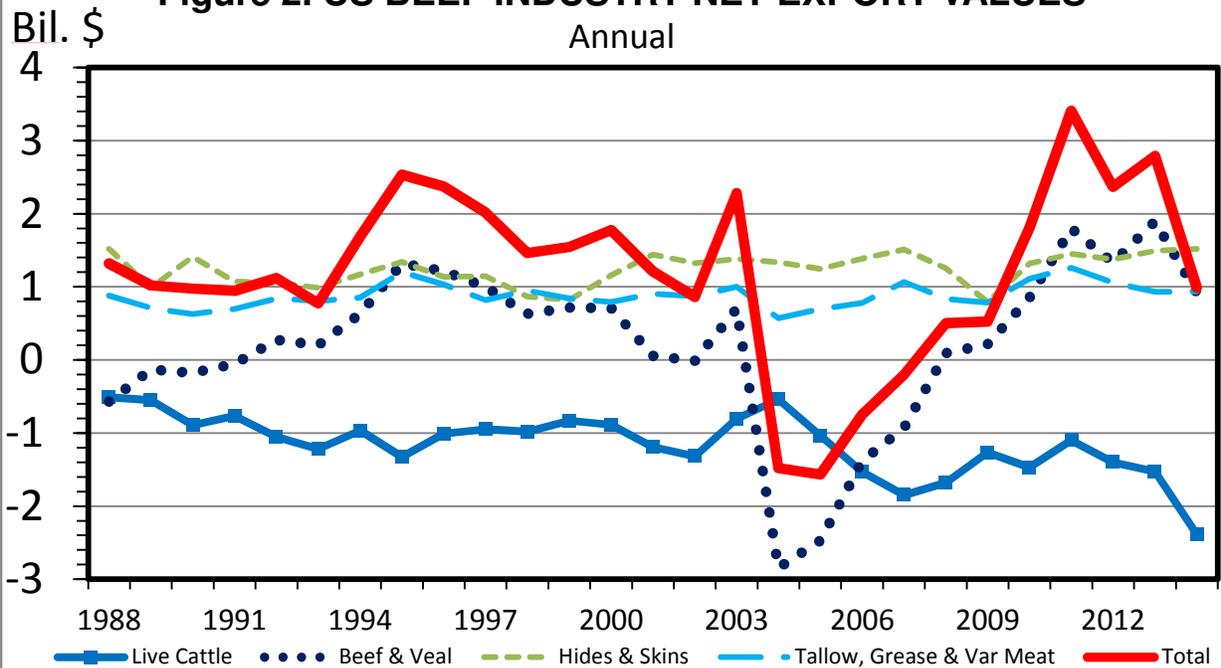


Figure 3. AVERAGE ANNUAL CATTLE PRICES

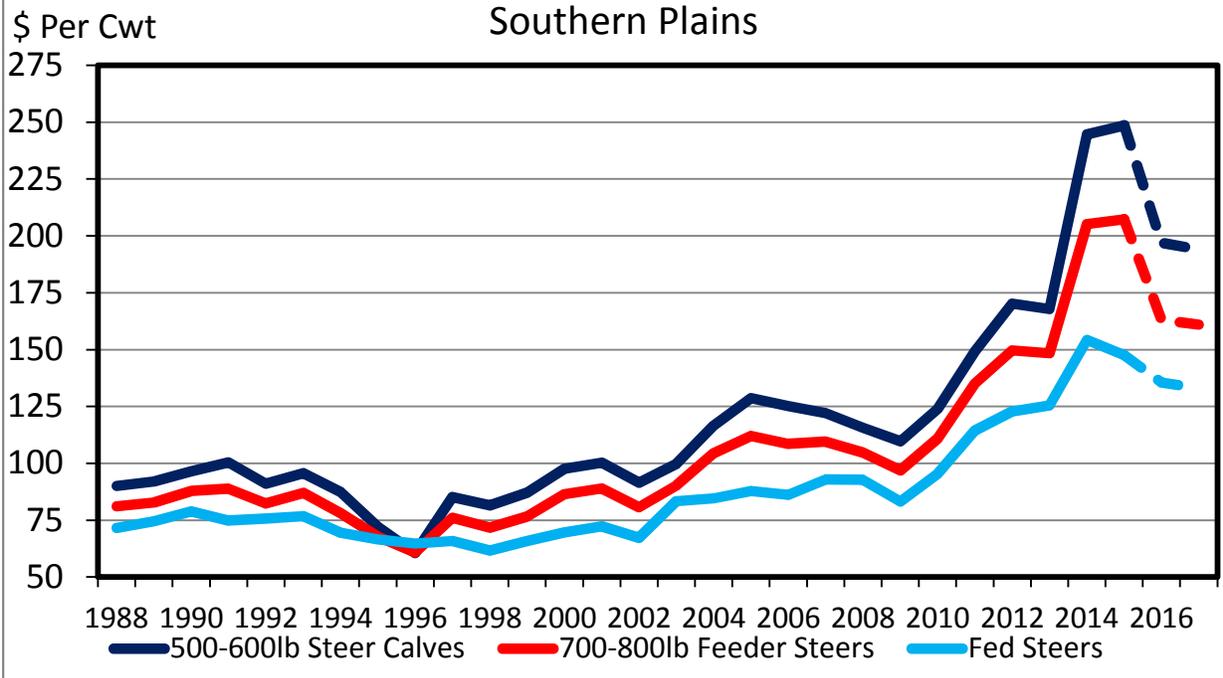


Figure 4. US TOTAL CORN SUPPLY AND PRICE

