May 2015

The Impact of Timely State Appropriations for Minnesota’s Response to Porcine Epidemic Diarrhea
Authors: Nandita S. Mirajkar, Michael Murtaugh, Kaylee Myhre Errecaborde, William Hueston, College of Veterinary Medicine University of Minnesota.
Multidisciplinary Review Team and References available on the FPRC Website.

Summary of Findings:

- The entry of a novel disease, Porcine Epidemic Diarrhea (PED), into the United States (U.S.) in 2013 caused the death of 7 million piglets, with Minnesota having the second highest number of farms affected. The disease caused consumers to pay 13% higher prices for pork products.
- Pig production is a $6.9 billion industry in Minnesota, and a $22.5 billion industry in the U.S.
- The Minnesota state-funded Rapid Agricultural Response Fund allocated $100,000 within two months of PED emergence for the development of essential diagnostic tests and the state Legislature provided an additional $200,000 a year later to investigate risk factors associated with the spread of PED.
- The timely allocation of these state-appropriated funds early in the outbreak likely expedited the early detection of rapidly spreading PED and may have reduced overall losses to Minnesota’s pig industry.

Novel PED emergence in Minnesota and the U.S.:
In April 2013, the U.S. confirmed its first case of Porcine Epidemic Diarrhea (PED), a novel disease that resulted in severe diarrhea and death in pigs of all ages, especially piglets. The outbreak was caused by an environmentally stable and highly contagious infectious virus transmitted through feces. The disease caused the death of an estimated 7 million piglets in the U.S. in the first year after its emergence. The disease reduced the availability of pork products in retail stores and led consumers to pay 13% higher prices for pork. As of March 2015, the disease had been detected in 34 states in the U.S., with Minnesota ranking second highest in the country for the number of positive farms.

Importance of the pig industry in Minnesota and the U.S.:
Pig production generated a total economic output of $6.9 billion in Minnesota in 2011, accounting for 35% of the state’s livestock earnings and 55,000 jobs. Minnesota ranks second amongst U.S. states for the number and value of pigs raised by its farmers. In 2012, the U.S. pig industry had sales of $22.5 billion, which accounted for 6% of total U.S. agricultural sales. The U.S. ranks second in pork production worldwide, and Americans consume over 47 pounds of pork per person annually. Pork products are a rich source of proteins, vitamins and minerals, and account for over 36% of all meat consumed globally.

Challenges encountered in response to PED in Minnesota and the U.S.:
Although PED was known in Europe and Asia since the 1970’s, it was unknown in the U.S. before the first outbreak in April 2013 with no general understanding in the U.S. of risk factors for infection or disease spread, and no effective tools for prevention and control. At that time, there were no established, validated laboratory diagnostic tests commercially available that could be imported for the strains causing the outbreak in the U.S., either to detect the virus or to identify previously infected pigs. Further, at the time of its emergence in the U.S., PED was not considered a notifiable disease by
the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), thereby making surveillance of the disease more difficult even if diagnostics had been available.

**Timeline of response to PED emergence in Minnesota and the U.S.:**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Event / Funding details</th>
<th>Impact / Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2013</td>
<td>First case of PED in the U.S.</td>
<td>Beginning of the PED outbreak in MN and the U.S.</td>
</tr>
<tr>
<td>June 2013</td>
<td>$100,000 from the Minnesota Rapid Agricultural Response Funding (MN-RARF)</td>
<td>Awarded to the Minnesota Veterinary Diagnostic Laboratory to develop a rapid diagnostic test to detect the virus and to study its genetic relationship with the PED virus found in other countries.</td>
</tr>
<tr>
<td>Starting June 2013</td>
<td>Cumulatively $1.7 million from the National Pork Board</td>
<td>Gradually awarded to universities across the U.S. to fund the development of diagnostic tests and research on PED</td>
</tr>
<tr>
<td>June 2014</td>
<td>$26.2 million from the USDA</td>
<td>Allocated to fund producers to support biosecurity practices and diagnostic testing, to help states to support disease control activities, to aid veterinarians to develop herd management plans, and for research to develop vaccines. The USDA-APHIS also made reporting of PED mandatory to help surveillance efforts and to slow the spread of the disease.</td>
</tr>
<tr>
<td>July 2014</td>
<td>$200,000 from the Minnesota State Legislature</td>
<td>Awarded to the University of Minnesota - College of Veterinary Medicine for research on the risk factors associated with the spread of PED.</td>
</tr>
<tr>
<td>September 2014</td>
<td>Release of two conditional-license vaccines for PED</td>
<td>A result of more than a year of industry efforts to develop vaccines for reducing the impact of PED.</td>
</tr>
</tbody>
</table>

**Insights gained from Minnesota’s response to PED:**
The emergence and rapid spread of PED created significant problems in Minnesota, it affected the livelihoods of producers and agricultural workers, and increased the cost of pork for consumers. The amount and timing of research support was important for rapid intervention and control of disease. Rapid funding of $100,000 through the MN-RARF, a month after the first report of PED, affirmed the purpose for which these funds were appropriated by the Legislature. The MN-RARF funding jump-started the development of a specific and sensitive laboratory test that was crucial in disease diagnosis and also provided a foundation for further research in PED. Additional allocations in July 2014 helped to identify risk factors for PED spread to inform the design of prevention and control strategies. While the state support for PED research appears small in comparison to the amount ultimately committed by the U.S. government and the pork industry, the early investment from the state likely helped to limit the impact on Minnesota pig producers.

The emergence of PED illustrates how a new disease can rapidly spread within Minnesota’s animal industry to negatively impact the health of livestock, the security of the food supply, and the state economy. Reviewing the impact of state appropriations to the MN-RARF and additional funding of University of Minnesota research on PED reinforces the importance of the timely and targeted distribution of state research funding to address emerging animal health issues in the Minnesota context.